



FEATURING—FROM IRONFOUNDING TO HOWITZER SHELL PRODUCTION

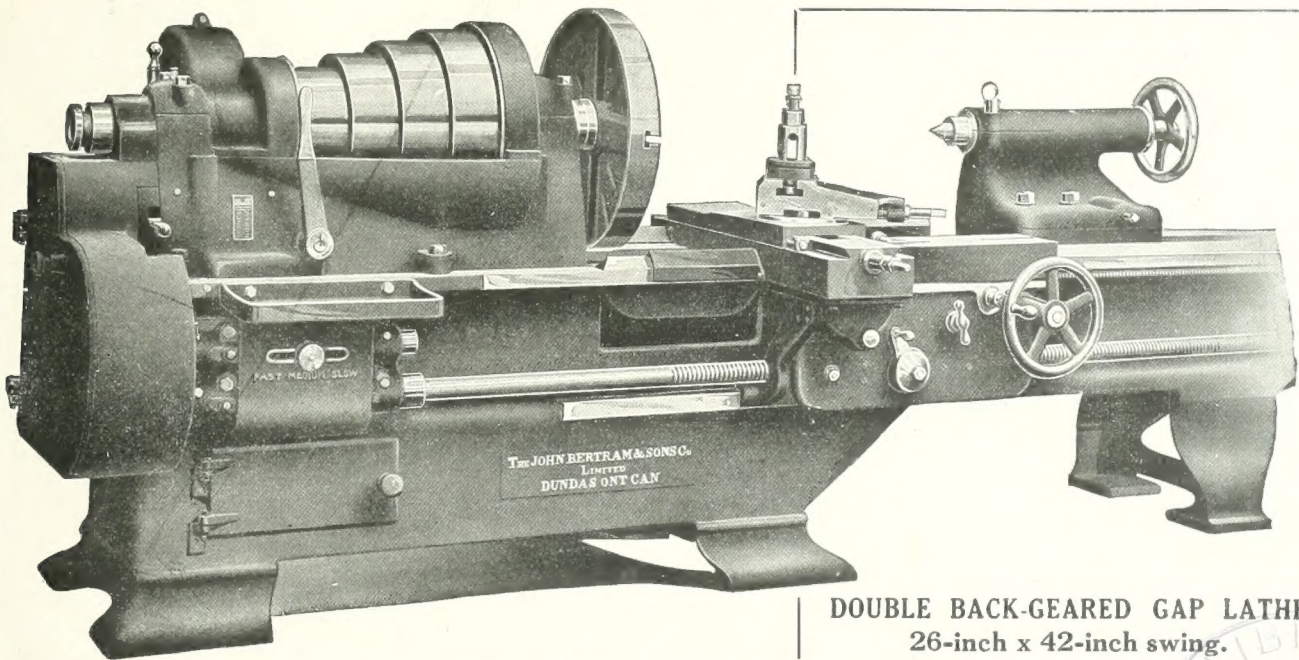
# CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XIV

Publication Office: Toronto, November 25, 1915

No. 221



DOUBLE BACK-GEARED GAP LATHE  
26-inch x 42-inch swing.

## BERTRAM MACHINE TOOLS

The convenience, accuracy and long service of Bertram Machine tools proves invaluable to every user.

This is a "Safety First" Machine, one that protects your employees against accidents and your plant against resultant damages.



### The John Bertram & Sons Co.

Limited

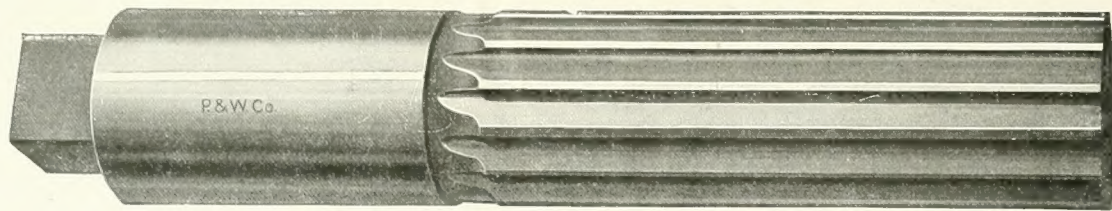
DUNDAS, ONTARIO, CANADA

MONTREAL  
723 Drummond Bldg.

VANCOUVER  
609 Bank of Ottawa Bldg.

WINNIPEG  
1205 McArthur Bldg.





## This Reamer Has **ECCENTRIC RELIEF**

The feature that gives it a  
**Safe Lead Over all Others in the Cutting Race**

Here's the reason why:

1. The section of the tooth is greater than when flat relief is used and therefore the reamer is stronger.
2. Reamer does not chatter.
3. Smoother hole is produced.
4. Working size of reamer can be retained longer.

Eccentric relief is a Patented Feature of

## All P. & W. Reamers

## Do Your Taps Cut Like This?

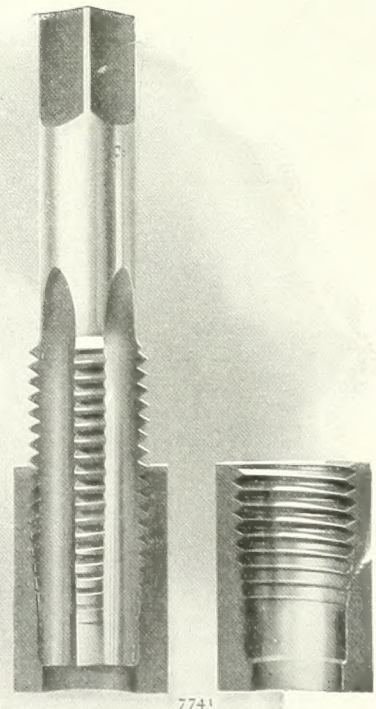
Illustration to right shows P. & W. Taper Hand Tap, after being forced by power nearly through a nut in which the hole was purposely drilled considerably smaller than the roof diameter of the tap.

## P. & W. TAPS

**Freest Cutting      Longest Life**

This, of course, left an excessive amount of work for the tap to do. Yet, because of the design and construction of the tap, there was no evidence of imperfect threading or any indication whatsoever of the hard usage to which the tool had been put.

Write for Catalog No. 8, "Small Tools," showing our complete line.



**Pratt & Whitney Company of Canada,  
Limited**

**DUNDAS**  
Ontario

**MONTREAL**  
723 Drummond Bldg.

**WINNIPEG**  
1205 McArthur Building

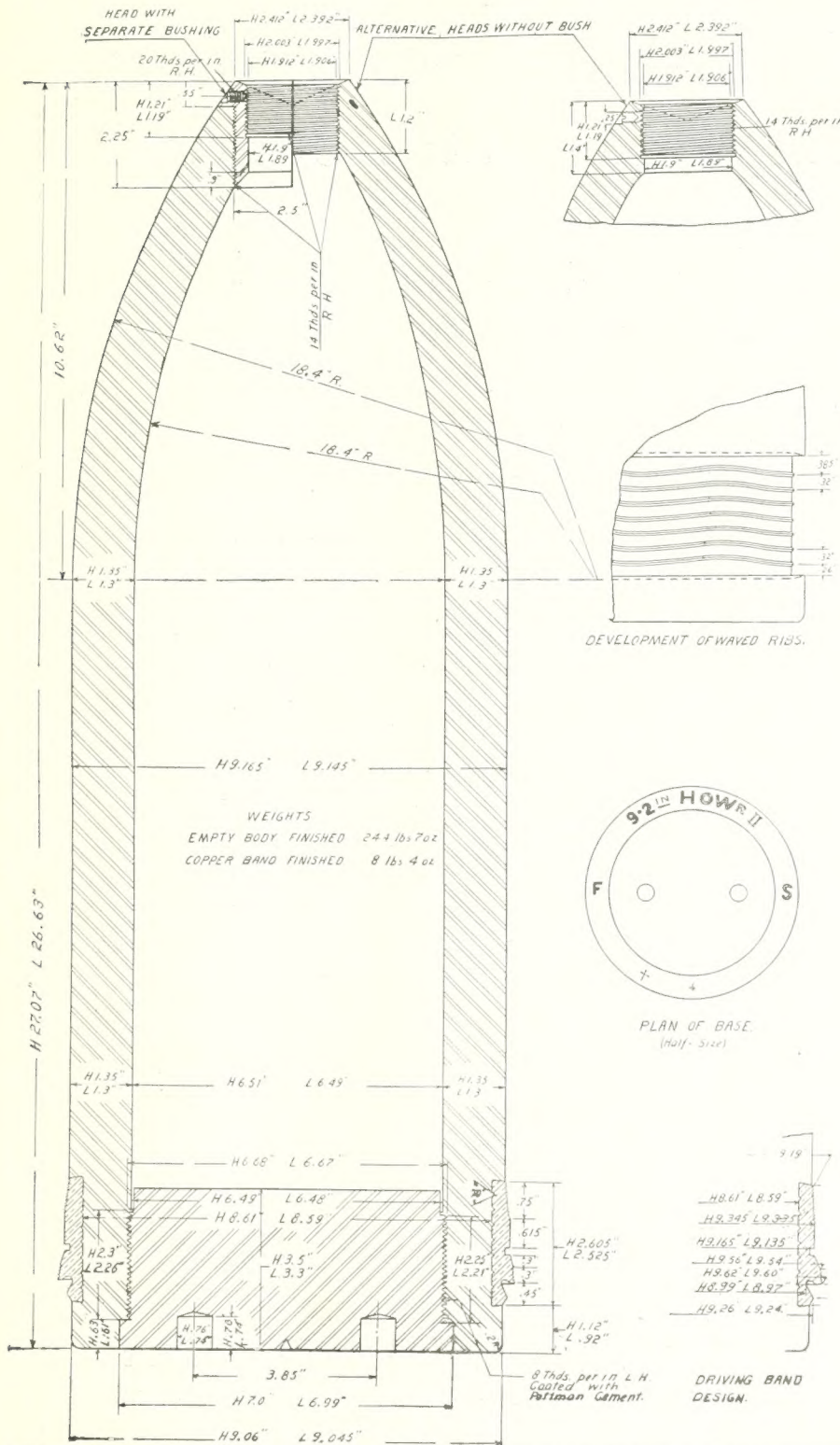
**VANCOUVER**  
B.C. Equipment Co.

*"The Tap with the Con-Eccentric Land."*



# LATHES

## AND ATTACHMENTS



for the  
manufacture of  
6 in., 8 in.,  
9.2 in.  
**HIGH  
EXPLOSIVE  
SHELLS**

**EARLY DELIVERY.**

*This Equipment is all  
New, Modern, Heavy.*

**Write Our Nearest Office For  
Particulars.**

**The John Bertram  
& Sons Co., Limited**  
DUNDAS, ONT., CANADA

MONTREAL  
723 Drummond Bldg.

VANCOUVER WINNIPEG  
609 Bank of Ottawa Bldg. 1205 McArthur Bldg.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# The Publisher's Page

By B.G.N.

## Something Unusual—Something Extraordinary Has Happened

YOU—our friends, our subscribers and advertisers, have played a splendid part in supplying munitions to the Allies. You have been confronted with a thousand problems which, one by one, you have cheerfully tackled and solved. You have acquitted yourselves well.

You have freely acknowledged the valuable assistance that this journal has continually rendered from the first. That CANADIAN MACHINERY has been doing good work for the Empire Manufacturers far afield will, however, prove a pleasant surprise to many of our readers.

*Read the letter on the outside back cover of this Issue.*

(If your advertisement is not in CANADIAN MACHINERY, it is out of one of the liveliest mediums in the world.)

CANADIAN MACHINERY

143-153 University Avenue,

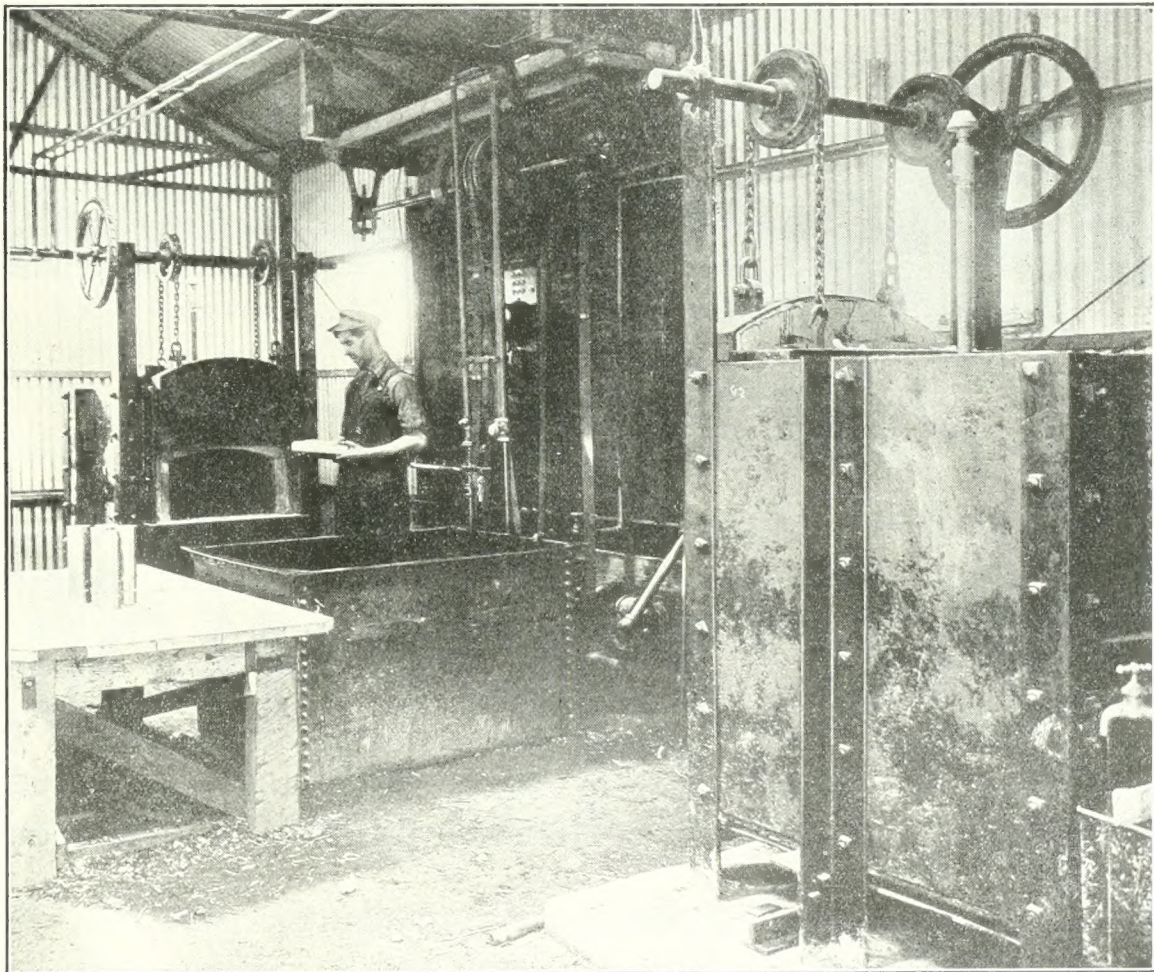
TORONTO



# HEAT-TREATING FURNACES FOR SHELL WORK

**"MECOL" FURNACES** especially designed for this work  
are giving entire satisfaction with OIL, GAS, and other fuel

DESIGNED AND BUILT IN CANADA



**Mechanical Engineering Furnaces installed in plant of A. B. See Elevator Co., Montreal**

‡ Shell, Howitzers and Cartridge Cases must be accurately HEAT TREATED for successful manufacture.

‡ See our Special Continuous Furnace for annealing Brass Cartridge Cases before buying your equipment.

‡ Largest manufacturers have them in use. Full particulars on request.

*All Furnaces designed and built under personal supervision of F. DITCHFIELD, "THE FURNACE MAN."*

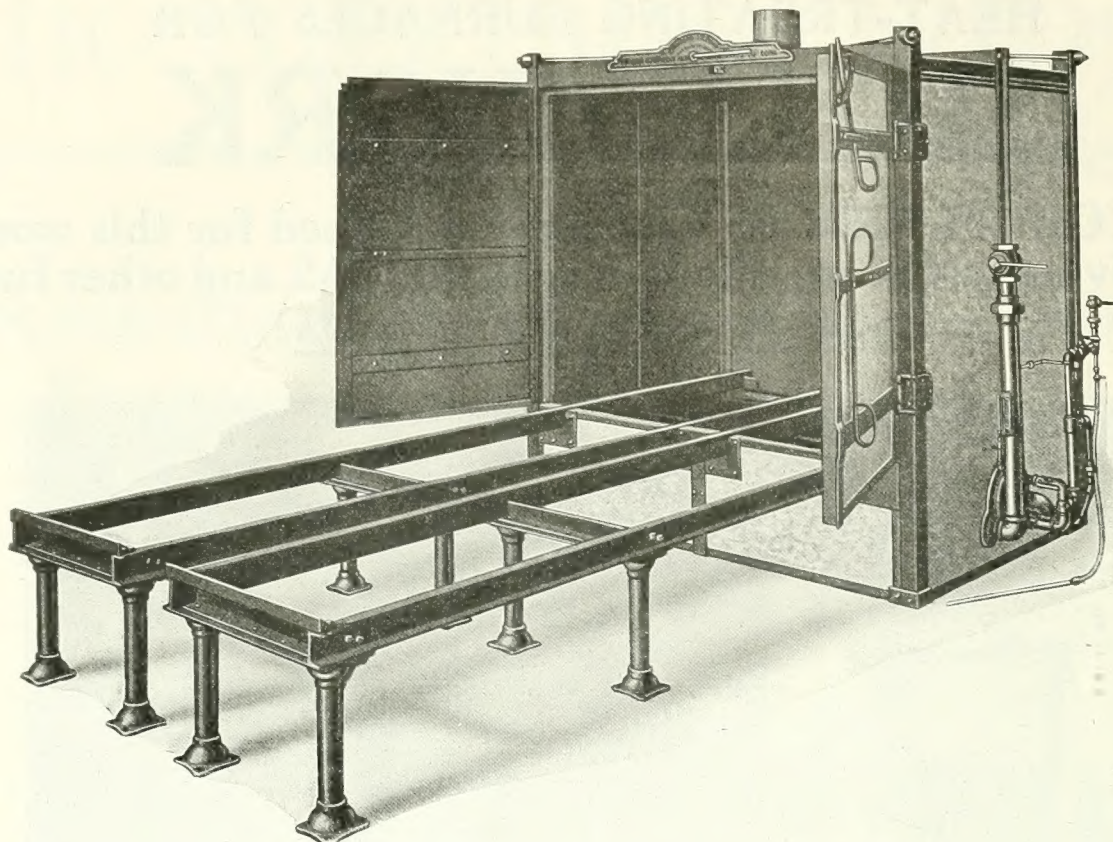
## **Mechanical Engineering Company, Limited**

**55 COTE STREET, MONTREAL, QUE.**

**PHONE—MAIN 3585**

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





**A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.**

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasolene or producer gas can be used with any type of oven.

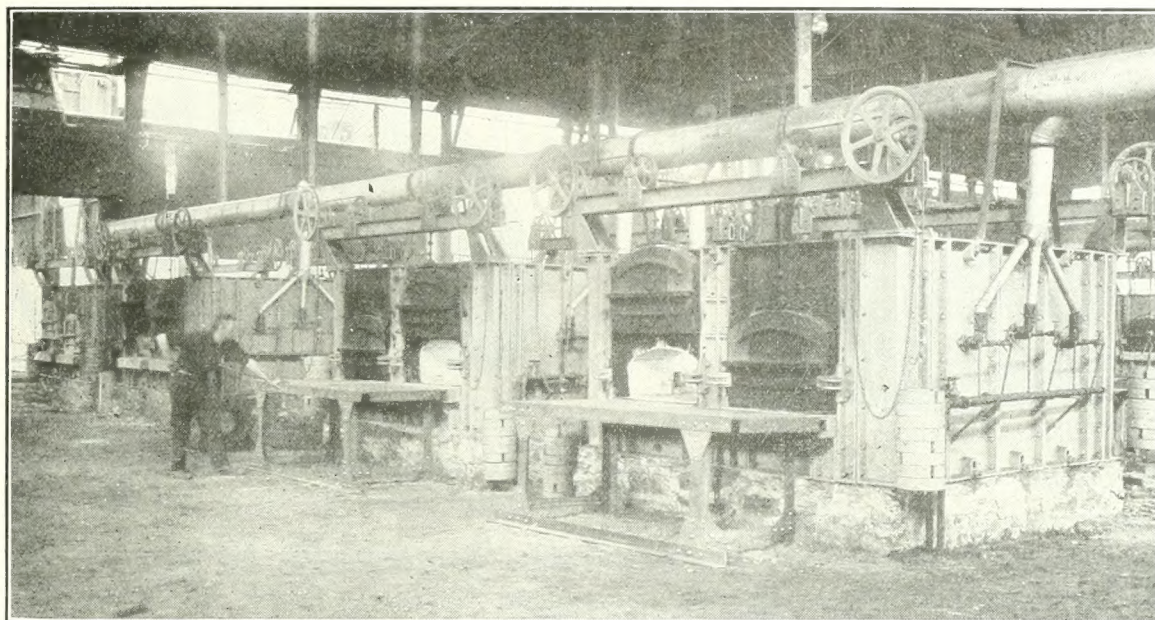
Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

**The Oven Equipment & Manufacturing Company**  
NEW HAVEN, CONN.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

*The advertiser would like to know where you saw his advertisement—tell him.*





TATE-JONES FORGING FURNACES, PENN'A STEEL CO., STEELTON, PA.

# FORGING FURNACES FOR HIGH EXPLOSIVE SHELLS

"Tate-Jones" Forging Furnaces for High Explosive Shell Work are properly designed and constructed to give maximum output per unit of fuel burned and per square foot of floor space occupied.

Properly heated billets mean for you more rapid production and fewer rejections.

Write us about the size and number of shells you desire to handle for information in regard to "Tate-Jones" Forging Furnaces.

Ask for Bulletin "Shells and Shell Furnaces"

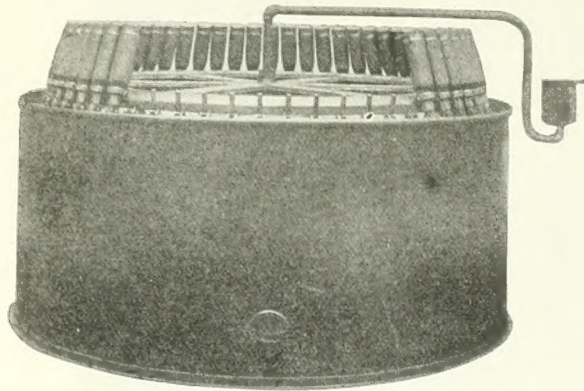
**TATE-JONES & CO., Inc.,** **PITTSBURGH, PA.**  
**FURNACE ENGINEERS**

Ontario Agents: Rudel-Belnap Machinery Company, Toronto

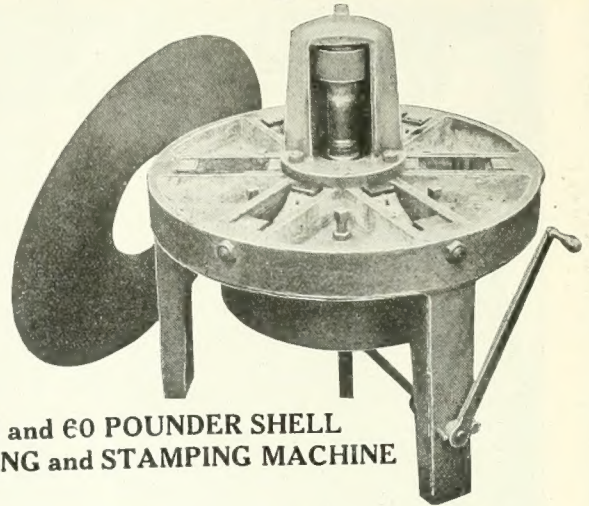
*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# Shell Painting, Nosing and Banding Machines



PAINTING MACHINE



4.5 and 60 POUNDER SHELL  
BANDING and STAMPING MACHINE

**SIMPLICITY:** That is the beauty of these machines; they are so simple that a woman or even a child can control them. This is an important feature in reducing operating expenses.

Banding Press is sold without stamping attachment if desired.

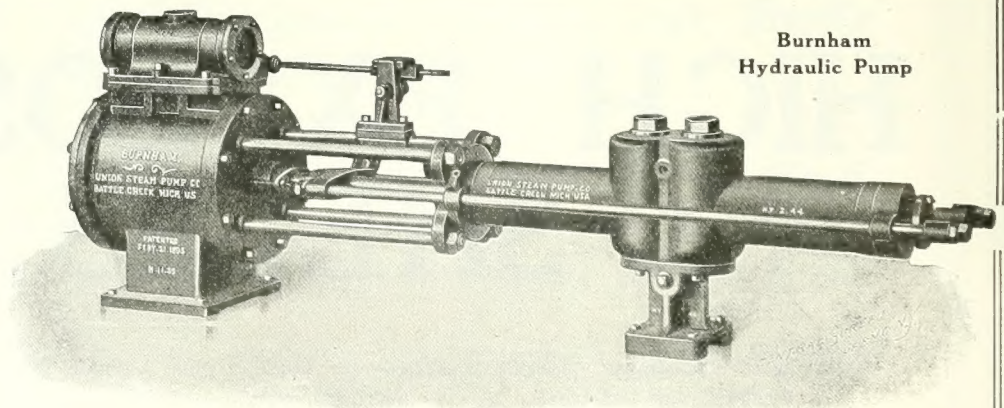
Painting Machine is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.

**Canadian Locomotive Company, Limited, Kingston, Ont.**

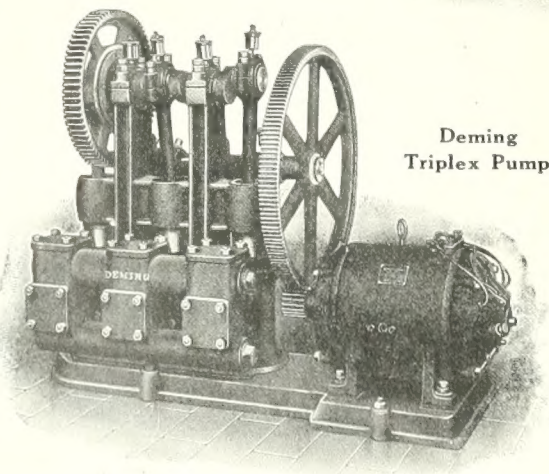
SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our agents for these machines

## Pumps for SHELL MAKERS



Burnham  
Hydraulic Pump



Deming  
Triplex Pump

**G**OOD PUMPING MACHINERY is essential to greatest output on shells or any other work.

We manufacture a special pump for every kind of service.

Tell us what you need and ask for full details.

MADE IN CANADA

**Darling Brothers Limited**  
Toronto MONTREAL Winnipeg

*The advertiser would like to know where you saw his advertisement—tell him.*



# SOUTHWARK

## HYDRAULIC BANDING MACHINE —For Compressing Copper Bands on Shells

When the copper tubing band is slipped over the shell and pressed into the correct location, the shell is ready for the SOUTHWARK Hydraulic Banding Press.

This machine does the work quickly and in accordance with accuracy standards.

Just two squeezes are necessary to close the rifling band properly into the groove—the shell being given a half turn after each squeeze.

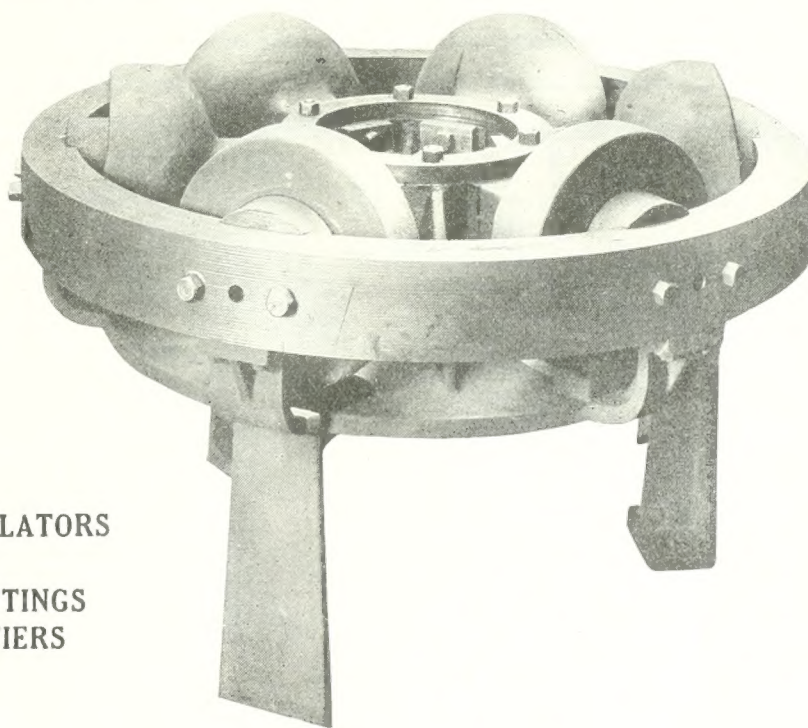
These presses can be operated either with an individual pump or from an accumulator, or with a hydraulic pneumatic intensifier where air pressure is used for intensifying the water pressure in the press cylinders.

The whole construction is for high speed production. We have patterns for machines banding up to 15-inch shells.

In writing for information or quotation please advise width and thickness of bands and diameter of shells to be banded, and power available.

CONSULT US ABOUT  
**Hydraulic Machinery**  
For All Purposes

PRESSES	JACKS
HOISTS	ACCUMULATORS
PUMPS	CRANES
LEATHER PACKINGS	PIPE FITTINGS
RIVETERS	INTENSIFIERS
GAUGES	VALVES
ETC., ETC.	



**Southwark Foundry & Machine Company**  
PHILADELPHIA

Founded 1836

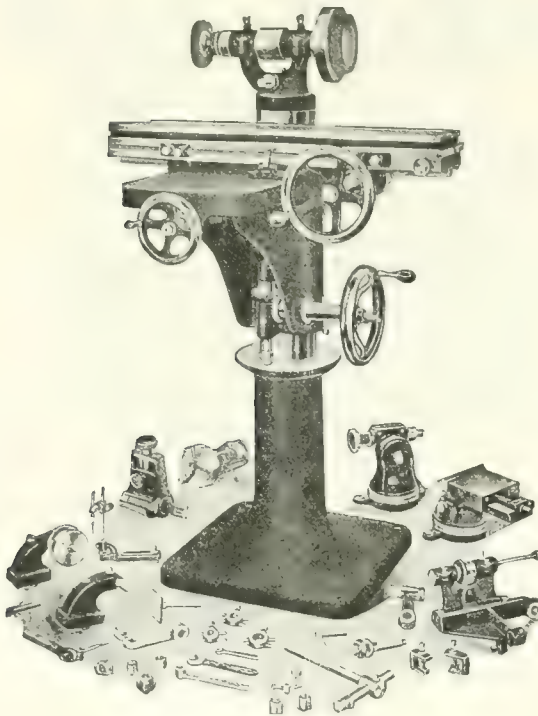
Old Colony Building, Chicago

Brown-Marx Building, Birmingham

"First Builders of Large Centrifugal Pumps in America."

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





The *Greenfield*

## For Special Work, Tools, Jigs, Etc.

This Universal Grinder is just the machine needed in many of the shops engaged in equipping for the manufacture of special lines. It is an all-around grinder and will handle about any kind of a job that comes within its range.

It has a stiffer, more rigidly supported table than any similar machine. It will turn out accurate, dependable work. Also, we believe we are perfectly correct in stating that we furnish this machine with a larger and more complete set of attachments than can be had for any grinder selling at anything like the same price.

How can we do it? Specialization and building in quantities.

*Ask for Catalog No. 5, showing the machine in twenty-one different "set-ups" and explaining the purpose of each.*

### Greenfield Machine Company

Greenfield, Mass., U. S. A.

## Two Cuts

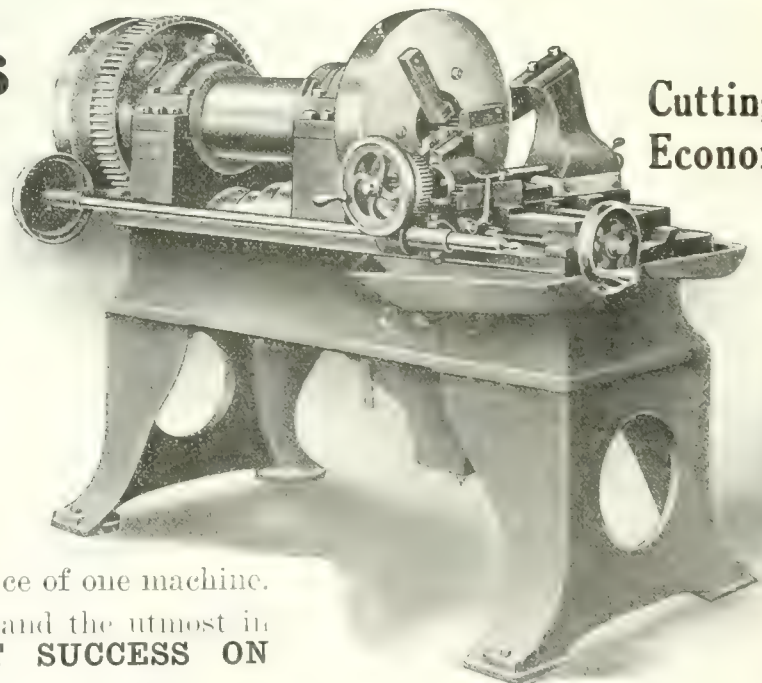
### Simultaneously

One up, the other down. This is what makes the **Hurlbut - Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut - Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.



Cutting-off  
Economy

5-inch Accelerated Machine

## HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

FOREIGN AGENTS: England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PIERCE, TORONTO, CANADA.

*The advertiser would like to know where you saw his advertisement—tell him.*



# KEMPSMITH

## MILLING MACHINES

Embody the following three distinctive features of construction, which make them unusually rigid and convenient in operation:

### Keyed Overhanging Arm

This patented feature provides for positive alignment of arbor and boring bar, and prevents the cutter being pounded out of line under cut.

### Keyed Spindle Nose

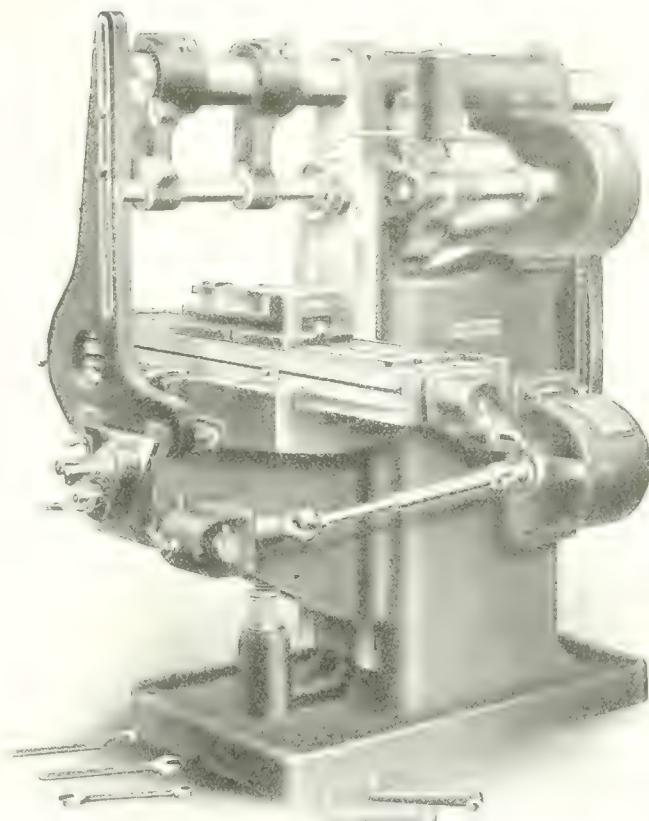
Our patented spindle nose is slotted for positive drive of arbor, and also permits the use of either right hand or left hand face milling cutters.

### Reversible Outboard Support

Outboard support is a rigid one-piece casting, reversible according to direction of cut. It leaves ample room for the operator to handle his work.

Catalog explaining this and other features gladly sent on request.

**KEMPSMITH MFG. COMPANY**  
MILWAUKEE, WIS.



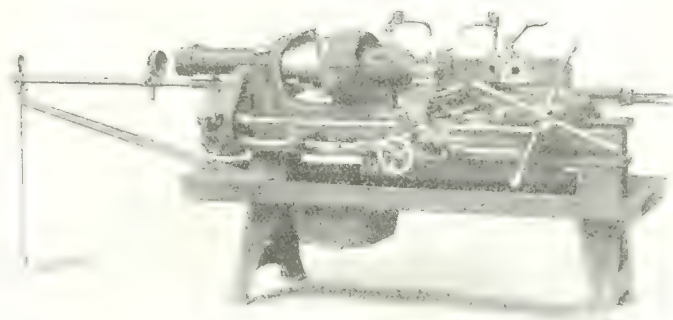
## For Double Duty

While the tools of the hexagon turret are boring or turning, you can face or form or undercut with the tools of the square turret on the carriage, thus taking two cuts at one time on the

## No. 4 UNIVERSAL Turret Screw Machine

This is because the carriage and turret saddle have separate feed shafts, entirely independent of each other, and each with a wide range of feeds adaptable to any diameter within the capacity of the machine.

Incidentally, the exceptionally broad equipment of standard tools provided for this machine makes it possible, without special tools, to handle almost any kind of work with great rapidity, accuracy and economy.



No. 4 Universal Turret Screw Machine with Boring Equipment

To find the time-saving on your work, send blueprints with rough and finished samples.

**THE WARNER & SWASEY CO.,** Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

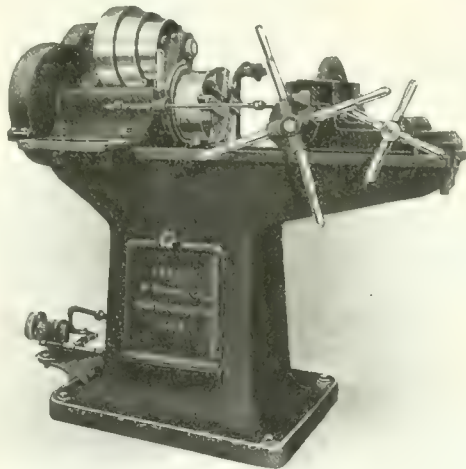
*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# VALUABLE FEATURES

It's the proper relation of many valuable features, rather than one single point, which assured the rapid and accurate production so characteristic of the Landis Die.

These features are:



The **long life**.

The **line contact** between chaser and stock, which reduces the friction to a minimum, thereby allowing exceptionally high cutting speeds.

The **variable rake angle**, which permits of a grinding suitable for any material.

The **permanent throat**, which insures close to shoulder work throughout the life of the chaser.

The **absence of annealing, hobbing and retempering**.

**Right and left hand** threading with the same set of chasers.

The Landis Die means a saving of 50% on your threading cost.

Are you interested?

**LANDIS MACHINE COMPANY, Waynesboro, Pa.**

Exclusive Canadian Agents:—Williams & Wilson, Limited, Montreal, Canada.

# A MODERN SAVER

of Time, Money, Space and Labor

Here is a machine that is well worthy of your attention — our "Double C Punch and Shear" with 48-inch throat.

This machine has an enormous capacity for doing rapid, accurate and economical work of quality.

Let us send full description. If you are interested in up-to-date money-saving machinery you cannot afford to remain uninformed.

We manufacture a complete line of

## LABOR-SAVING MACHINERY

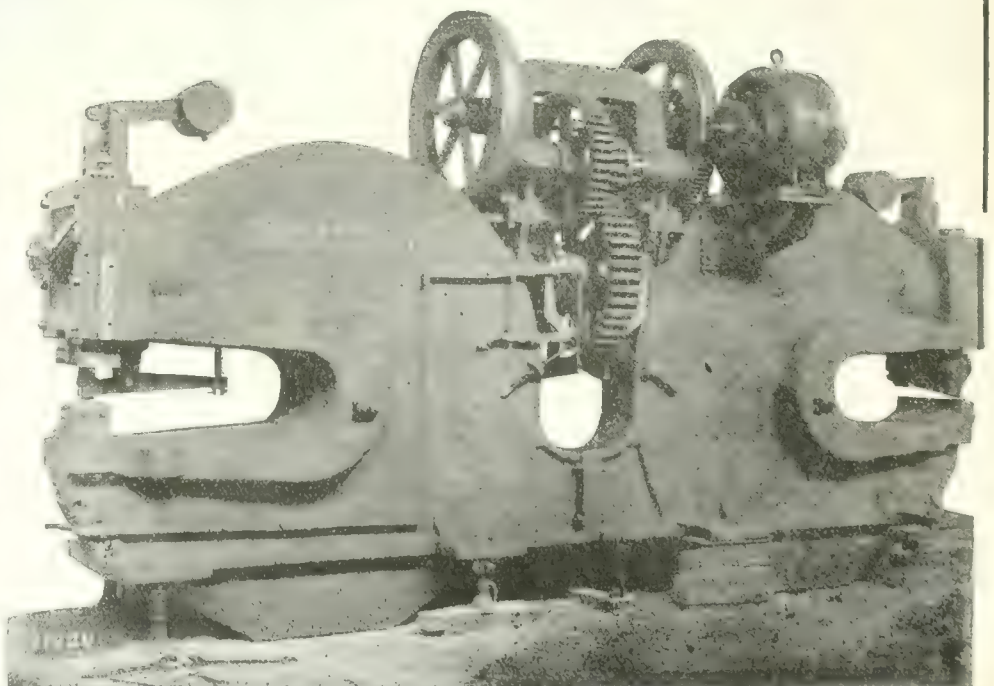
all kinds and sizes, for

Structural Iron Works, Railroad and Locomotive Shops, Boiler Shops, Rolling Mills, Agricultural Implement and Plow Shops, etc

**The Long & Allstatter Co.**  
HAMILTON, OHIO

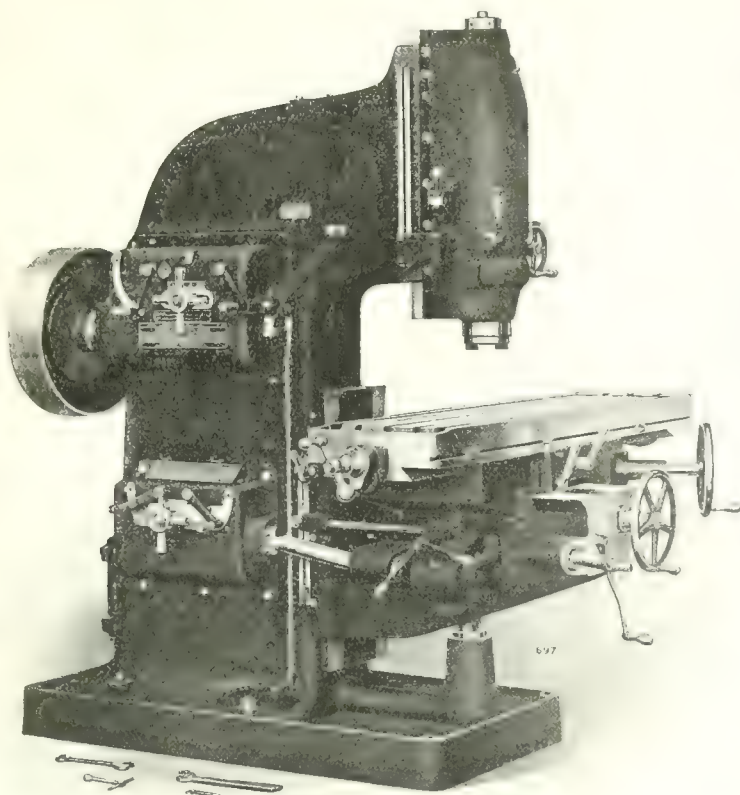
Canadian Representatives  
**RUDEL-BELNAP CO.**

Montreal, P.Q. Toronto, Ont.



*The advertiser would like to know where you saw his advertisement—tell him.*





## High Power Vertical Cincinnati Millers

are made in three sizes—28", 34", and 42" table travel, and of 5 h. p., 7½ h. p. and 10 h. p., respectively

Heat Treated Alloy Steel Gearing; locked tumbler; single plunger trip; feed levers control reverse and always indicate which way the table will move; sight feed oilers. **THE SPINDLE HEAD** is made in large proportions—see illustration; head can be securely bolted to the column when doing heavy milling. **THE DRIVE** is always through the main gear close to the lower bearing. **THE SPINDLE BEARINGS** are always the maximum distance apart.

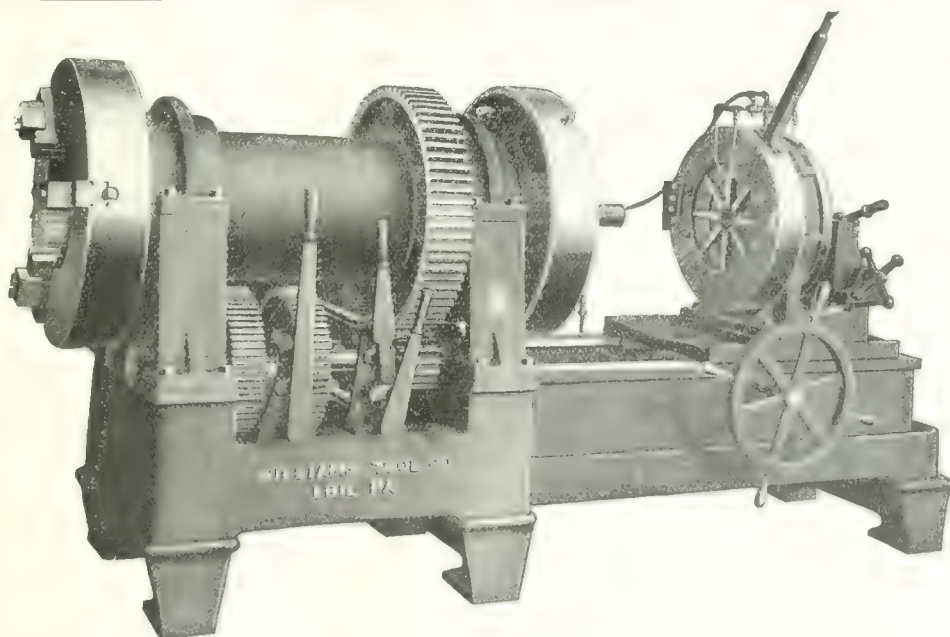
The Spindle has a flanged end and uses the same face mills that fit twenty-two different Cincinnati Millers.

The No. 4 is furnished with our improved **POWER QUICK RETURN**.

Because of all these features these machines have greater capacity than other Verticals of equivalent size.

**The Cincinnati Milling Machine Co.**  
Cincinnati, Ohio.

Canadian Agents: H. W. Petrie, Ltd., Toronto, Ont.  
H. W. Petrie of Montreal, Ltd., Montreal, Que.  
Taylor Engineering Co., Ltd., Vancouver, B. C.



## The Williams Pipe Machines

were awarded the highest prize at the Panama-Pacific International Exposition at San Francisco.

Pipe and Cutting-off machines for every purpose, 1½ to 18", including Nipple and Bolt Cutting Machines.

Also machines for cutting off open ends and facing closed ends of Shells, 3 to 10".

*Let us quote you prices and terms: any machine to cut 10 sizes of pipe between 1-4 inch and 18 inch, with any kind of power.*

Anyone making, selling or buying a pipe machine, claimed to be a Canadian-made Williams Pipe Machine, does so without right or authority from us, and is liable to prosecution for damages.

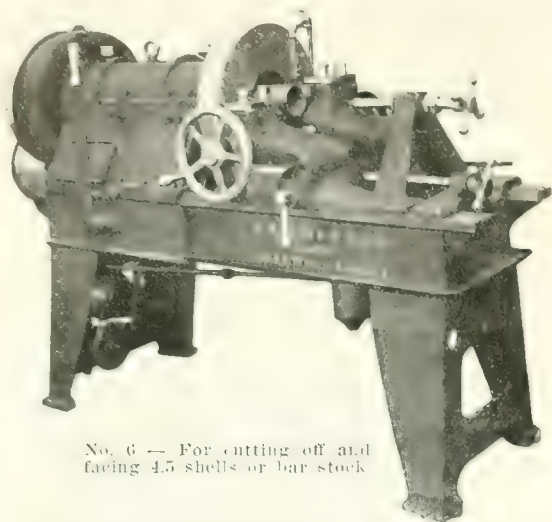
**Williams Tool Co., Erie, Pa., U.S.A.**

AGENTS:

**A. R. WILLIAMS MACHINERY COMPANY**  
ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





No. 6 — For cutting off and facing 4.5 shells or bar stock

We manufacture a full and complete line of machinery for the above operations, used in the manufacture of shrapnel, 4.5, 60-Pr. and 10" shells.

Write us for particulars of our new 12" cutting-off machine, designed especially for the new 10" shells and ingots now to be made in Canada. Single or double cut at one chucking.

Let us tell you the nearest point at which you can see some of our machines in operation.

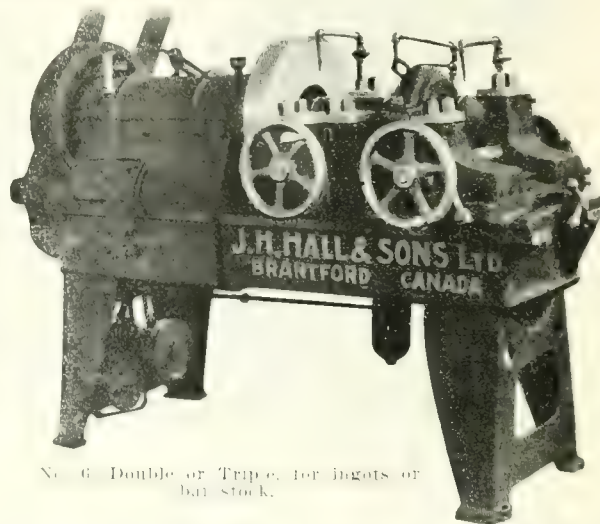
## John H. Hall & Sons, Limited

[Manufacturers of Pipe Threading and Special Machinery  
BRANTFORD, CANADA

## HALL SHELL CUTTING-OFF and FACING MACHINES

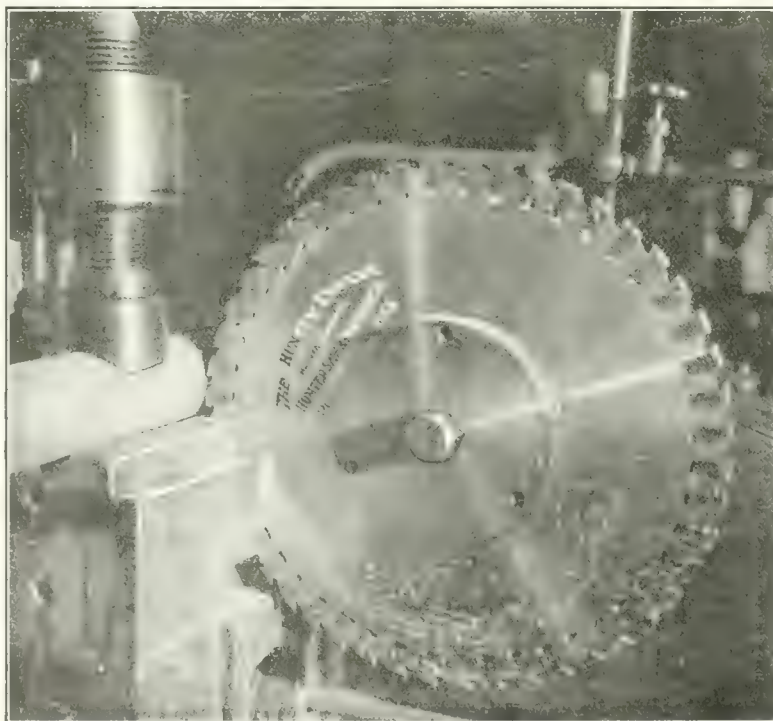
**For Shells, Bar Stock, Ingots—High Speed, Heavy Duty**

For cutting off the open ends.  
For facing off the closed ends.  
For facing off projecting ends of plugs.  
For cutting off bar stock.  
For cutting off ingots, any size.



No. 6 Double or Triple for ingots or bar stock.

## A Hunter "Duplex" on Shrapnel Stock



### FAST GOING on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

**2 MINUTES**

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably—on shrapnel or any other stock.

*Let us send full  
Particulars.*

**HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.**

*The advertiser would like to know where you saw his advertisement—tell him.*

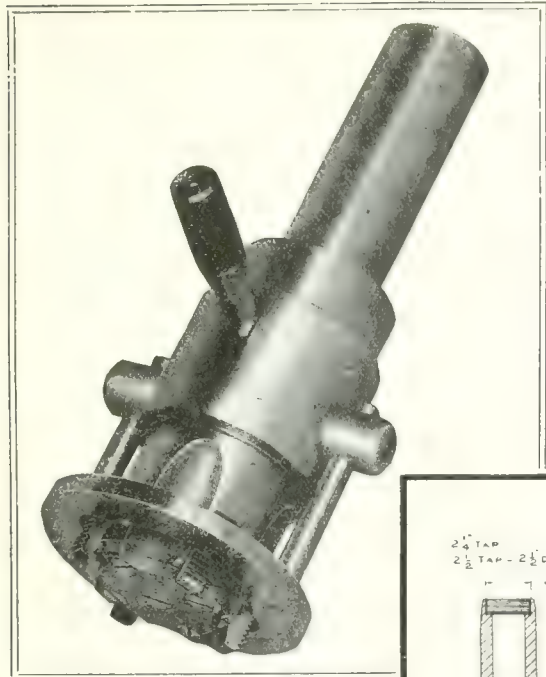


# "Murchey" Tools

are threading successfully  
all types and sizes of

## High Explosive Shells

English, French, Italian,  
United States and Russian.



## LARGE SHELLS

of 9.2" and  
12" diameter

are calling for improved  
and larger types of  
Tools to produce them.

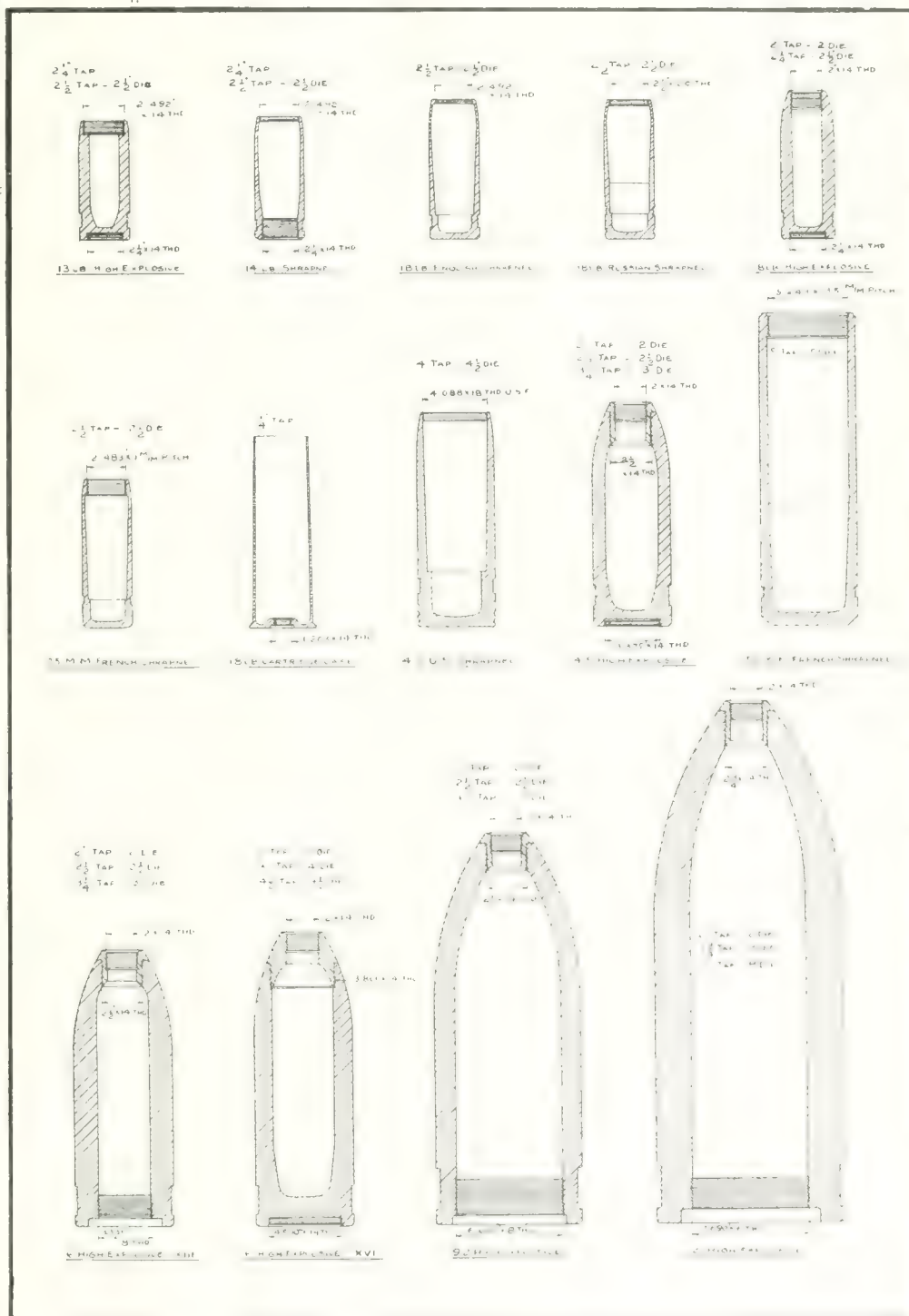
### Murchey Service

which means Murchey  
Collapsing Taps and  
Self-opening Dies — is  
doing this work NOW in  
a number of the largest  
munition plants with en-  
tirely satisfactory re-  
sults.

Send us B-P of your re-  
quirements and let us  
quote you on the neces-  
sary tools.

**Murchey Machine  
& Tool Company**

75 Porter Street  
DETROIT, - MICH.





## Grinding Ball Bearing Casings to an Exact Size

**T**HEY swear by the Aloxite wheel for their steel grinding in a New York ball bearing manufacturing plant. One important job is the grinding, to exact size, the outside steel casings for annular bearings.

### Aloxite—The Wheel for Steel—

Does the work quickly, clean and true. The wheel always cuts free and holds its shape, thus assuring accuracy of the work, uniformity of finish—and it cuts cool—shows long life.

*They have the right wheel in the right place.*

*Are you taking advantage of  
Carborundum service?*

**The Carborundum Company**  
Niagara Falls, N. Y.

Boston New York Philadelphia Pittsburgh Cleveland  
Cincinnati Grand Rapids Chicago Milwaukee  
Manchester, Eng. Dusseldorf, Ger.



## Cooling a High-Speed Drill Point with Mystic Cutting Compound

The drill in this instance is of the oil tube type and the photograph shows the free flow of Mystic Cutting Compound which keeps work and tool cool and free from chips.

## Mystic Cutting Compound

is a free-flowing, unsaponified animal oil lubricant. Its use means higher speeds, increased production and lower costs. It does not separate in solution, grow rancid or cause rust. It is non-combustible and contains nothing injurious to operators' hands.

Let us demonstrate *free of cost* what Mystic Compound can do for you.



**Cataract Refining Company, Toronto, Ont.**

*The advertiser would like to know where you saw his advertisement—tell him.*



# Sure Destruction

## To

# Big Tap Costs

### *Butterfield Taps*

are the cheapest in the end because they produce more work in a given time and last longer—and what they do is accurate



Butterfield Taps have, by their great success on shells demonstrated that NO JOB IS TOO TOUGH FOR THEIR QUICK DISPOSAL.

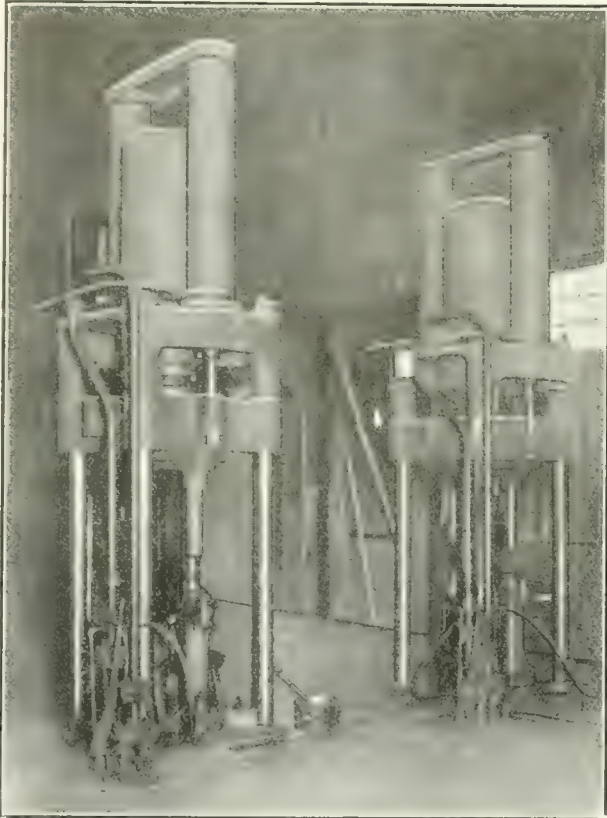
What we claim we stand ready to prove.  
Send a trial order. We guarantee satisfaction.

## Butterfield & Company, Inc.

ROCK ISLAND, QUEBEC

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



**DRAWING PRESSES**

# HYDRAULIC PRESSES

For Piercing and Drawing

## SHELLS AND PROJECTILES

Our facilities for manufacturing Hydraulic Presses assure you a product of very high quality and efficiency at reasonable cost.

Write us now. We are in a position to give you **PROMPT DELIVERY.**

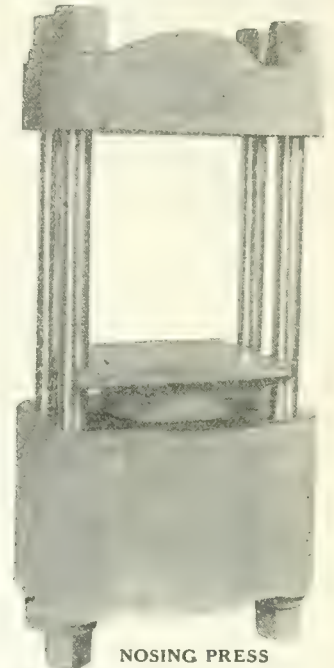
**The William Cramp & Sons Ship  
and Engine Building Company**  
PHILADELPHIA, PA.

# PRESSES

**Pumps  
and  
Accumulators**

**FOR ALL  
PURPOSES**

**Made in  
Canada**



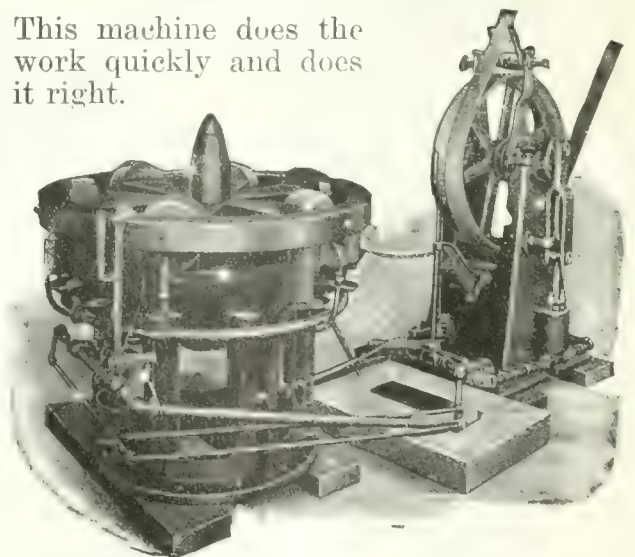
NOSING PRESS

**WILLIAM R. PERRIN, Limited**  
TORONTO

## Hydraulic Banding Machine

For compressing bands on shrapnel shells  
and other projectiles

This machine does the  
work quickly and does  
it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled. Machines for our Canadian Customers are built in Hamilton, Ont.

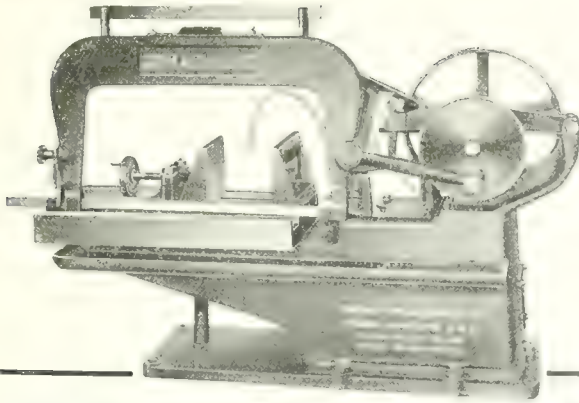
We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

**THE WEST TIRE SETTER COMPANY**  
ROCHESTER, NEW YORK

*The advertiser would like to know where you saw his advertisement—tell him.*





**ONE BLADE** on this machine does what **SIX** of the same kind will do on any other

The Racine Metal Cutting Machines are exceedingly easy on the blade, BUT THEY FAIRLY EAT THE METAL.

One reason for this is the Double Crank and the Toggle Motion which lifts the blade clear of the work on the return cutting stroke.

Another reason is the Saw Frame Girth which positively prevents springing and makes the machine easy and there are many other reasons that we will be glad to explain to you.

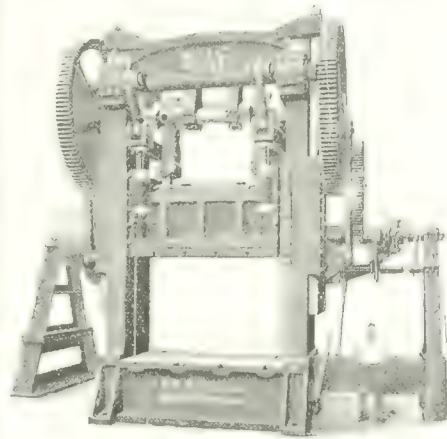
The Racine is a most efficient machine that will effect an immense economy in your plant.

Many Canadian plants have a list of them. One Canadian Steel Company has used 100 Racine machines and has saved \$100,000 in the cost of its work.

**Racine Tool & Machine Company**

15 Melbourne Ave., Racine, Wisconsin, U.S.A.

**Saves Time—Saves Power  
Makes Output Uniform**



Do you have to draw or form large sheet metal goods from heavy stock? If you do you will appreciate the patented toggle motion of the

## BLISS DOUBLE-CRANK TOGGLE PRESSES

Its action speeds up the work. It requires less power—and the results are uniform and better. Send for Catalog 11-G, stating requirements.

**E. W. Bliss Co.,** 20 Adams Street, Brooklyn, N.Y., U.S.A.

CHICAGO OFFICE: 622 West Washington Boulevard  
DETROIT OFFICE: Dime Bank Building



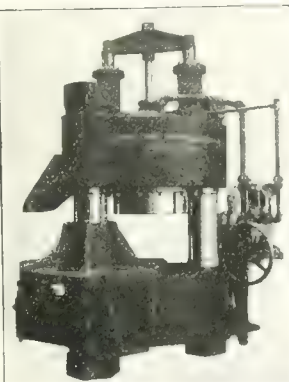
The Press of Great Efficiency and Unusual Adaptability—

## “TOLEDO” Arch Power Presses

No other press compares to this in design, construction, strength or economy for shops of limited space, or where special presses cannot be obtained. Built with solid or removable front piece to hold, geared, or plain dies, for wide range of uses. With solid front, adapted to work on piece tinware, sheet iron stoves, separators, etc. With front removed adapted to operating bumping hammers, winding dies and other work requiring high die space.

A “Toledo” Solution for Every Sheet Metal Problem.

**The Toledo Machine & Tool Co., Toledo, Ohio**



## ELMES HYDRAULIC PRESSES

Rapid-acting hydraulic drawing presses, piercing presses, pumps, and accumulators for making Shells, etc. High pressure fittings and valves, quick shipment.

Send for our illustrated catalog to-day

**Charles F. Elmes Engineering Works**

217 N. Morgan Street, Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

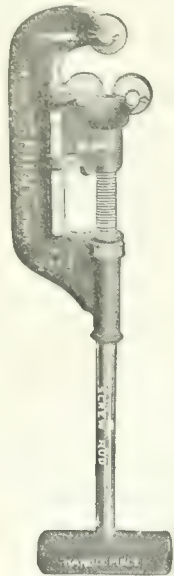
If what you want is not advertised in this issue consult the Buyers' Directory at the back.



# THE BANNER OF MERIT

HONOR AWARDED MEANS MERIT REWARDED

Showing the Official  
Award Ribbon of the  
Medal of Honor  
awarded TRIMO



TOOLS at the  
PANAMA-PACIFIC  
INTERNATIONAL  
EXPOSITION.



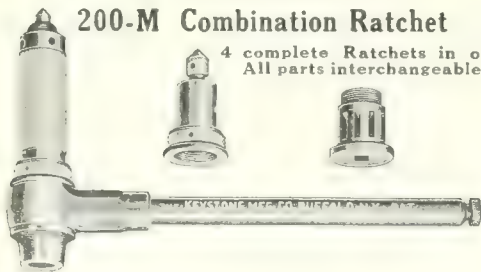
SEND FOR CATALOGUE No. 200.

TRIMONT MFG. CO., ROXBURY, MASS.

## "KEYSTONE"

200-M Combination Ratchet

4 complete Ratchets in one.  
All parts interchangeable



The Original

"WESTCOTT" Adjustable "S" Wrench

HANDLE MALLEABLE IRON, JAW FORGED STEEL.

The "Westcott" Wrench is acknowledged to be the most convenient and useful wrench for general use, and can be used in many places inaccessible to the Monkey Wrench. These wrenches are made of fastidious material are strong and durable.

The genuine "Westcott" Wrenches have the trademark "Westcott" on the handle.

## "Keystone Quality"

## KEYSTONE TOOLS

*are endorsed by the  
best of mechanics*

They are for their strength and convenience  
that make them the choice of all who know.

THE TOOLS YOU'LL APPRECIATE.

Supplied by any better class wholesaler, house.  
May we refer you to our order nearest to you?

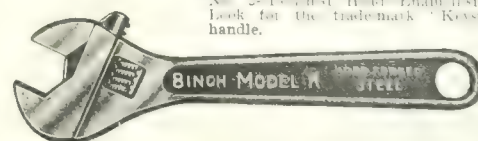
THE KEYSTONE MFG. CO.

BUFFALO, N.Y.

KEYSTONE "Model K" Wrench

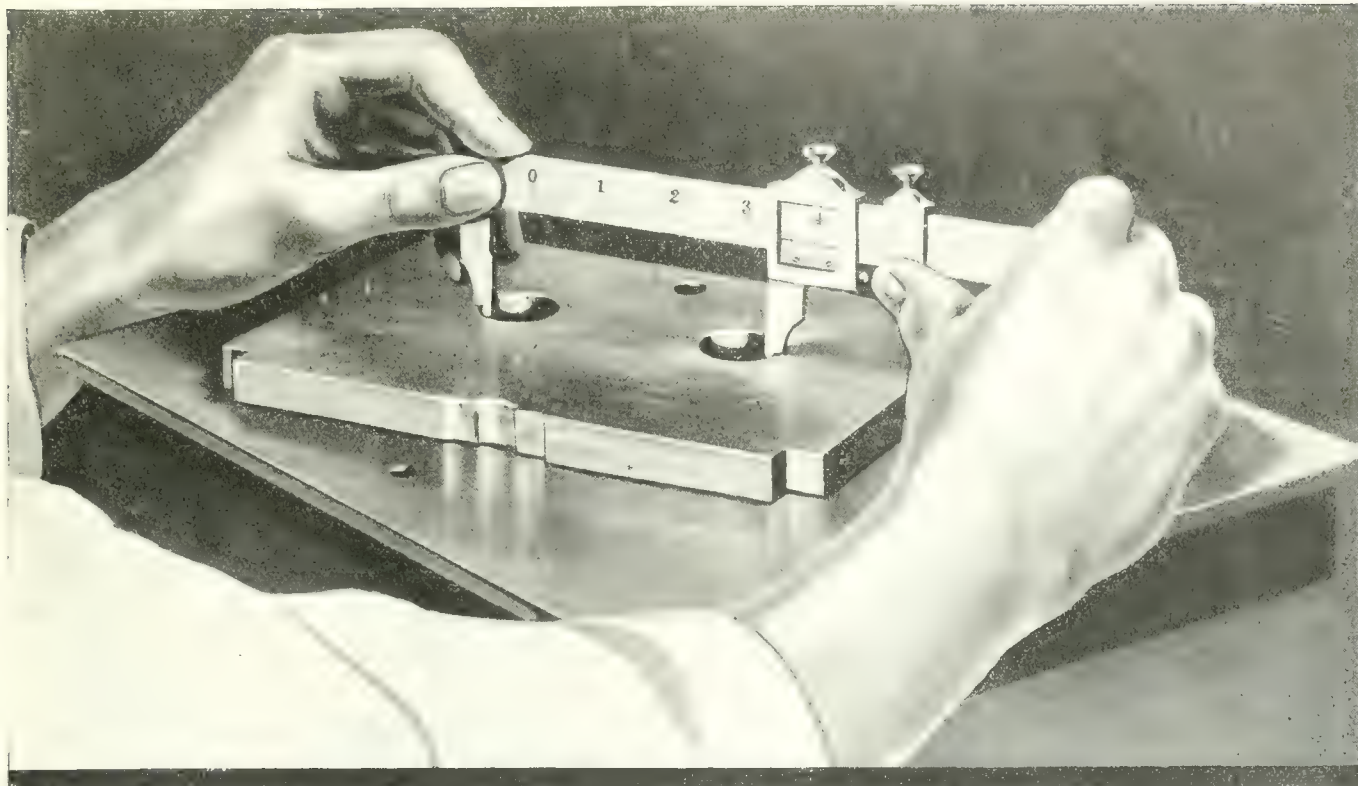
All drop-forged steel.

No. 1 Polished all over.  
No. 2 Polished Head, Enamel-Plated Handle.  
Look for the trademark "Keystone" on the handle.



*The advertiser would like to know where you saw his advertisement—tell him.*





## This Man Must Have Instruments of Precision

**H**IS work demands tools of extreme accuracy—his job depends upon them. When he wants tools or instruments that he can depend upon he goes to the leading dealer and asks for Starrett Tools by name.

# Starrett Tools

are mathematically accurate. Every engineer, machinist and high-class workman whose work requires accuracy, knows Starrett Tools to be standard. The time saved in accurate fitting and machining is of value not only to manufacturers, but makes the man with Starrett Tools a better workman. *Send for Free Catalog No. 20-3, prices, etc.*



**The L. S. STARRETT COMPANY**

*"The World's Greatest Tool Makers"*

**ATHOL, MASS.**

**NEW YORK**

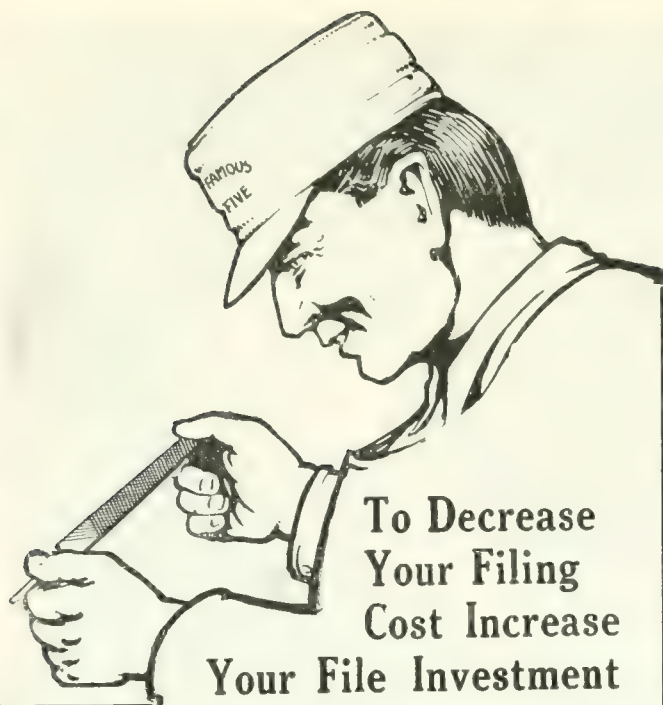
**LONDON**

**CHICAGO**



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





A file when it is half worn takes more time to do a certain piece of work than a new file.

Therefore when your files reach the "inefficient" point, they should be properly discarded and replaced with new ones.

Preferably with

## KEARNEY & FOOT GREAT WESTERN AMERICAN ARCADE GLOBE

(Made in Canada)

The cost of a new file more than pays for the saving in time and labor.

And with new files your workmen do cleaner, better work.

Our 50 years' experience in the making of the above brands guarantees their efficiency.

An output of 60,000,000 yearly proves their popularity.

A FREE copy of "File Philosophy" will be sent you on receipt of a card.

**Nicholson File Company**  
Port Hope (Dealers Everywhere) Ontario

## YOU WANT TOOL HOLDERS THAT HAVE MADE GOOD ARMSTRONG TOOL HOLDERS WERE AWARDED THE GRAND PRIZE

The highest possible award at the Panama-Pacific International Exposition

THEY ALWAYS MAKE GOOD

You can't afford to shut your eyes to a proposition which so directly affects your

**PROFIT and LOSS  
on LATHE and  
PLANER TOOLS**



Straight Shank Turning Tool



Left Hand Off Set Side Tool



Straight Shank Cut-Off Tool



Left Hand Off Set Cut-Off Tool



Planer and Shaper Tool



Boring Tool



Right Hand Off Set Cut-Off Tool



Threading Tool



Right Hand Off Set Side Tool



Right Hand Turning Tool



Knurling Tool

**TOOL HOLDER PROFIT**

No Forging.

Mighty Little Tool Steel.

Minimum of Grinding.

Machines All Running.

Men All Working.

**FORGED TOOL LOSS**

Blacksmiths' Time, etc.

Large Stock of "Dead" Tools, Steel, etc.

Men Waiting at Forge or Tool Room.

Machines Standing Idle.

Wasted Time and Material Grinding Tools.

**THE ARMSTRONG  
SYSTEM**

recognizes the Human Factor, cuts out Red Tape and increases efficiency of Men and Material.

More than 100 shapes and sizes for performing every operation on lathe, planer, shaper and slotter.

**THE LATEST ARM-  
STRONG CATALOG**

is a complete exposition of the whole Armstrong System. We want the man interested in keeping down production costs to have a copy mailed free for the asking.

Our complete line is on exhibition in Block 41, Palace of Machinery, Panama-Pacific Exposition, San Francisco.



**Armstrong Bros. Tool Co.**  
"The Tool Holder People"  
306 N. Francisco Ave., CHICAGO, U.S.A.

The advertiser would like to know where you saw his advertisement—tell him.





MANUFACTURERS OF  
SUPERIOR DROP-FORGINGS

## Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

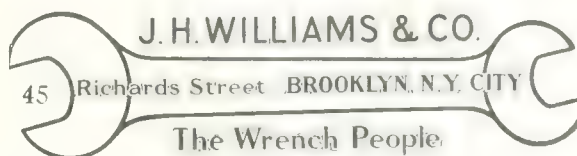
Utilize, protect and conserve high speed steel.

At two dollars per pound how much per cutting edge do you care to waste, support in idleness or scrap?

Have you considered

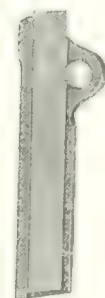
1. That no efficient cutter is consumed while at work?
2. That all lathe tools consumed are wasted in sharpening?
3. That you ultimately waste all the high speed steel you buy?
4. That the less you reduce to produce a sharp edge the less you waste?
5. That the working edge alone pays dividends and wages?
6. That the working edge has little weight?
7. That the bar section bought should be determined by the working end rather than the idle end of the tool?
8. That the idle volume of forged tools might better be made of a more suitable steel that costs less?
9. That maximum tool economy demands that the greatest number of perfect cutting edges be obtained per dollar expended?
10. That a single forged tool will only operate (between sharpenings) in one machine but if converted into small cutters and used in "AGRIPPA" Tool Holders it will keep a dozen machines humming constantly and provide spare cutters besides?
11. That as machines in use are capable of no greater performance than modern tool holders afford solid forged tools are extravagant?
12. That reshaping of tool holder cutters is but a moment's grinding work, while reforming a solid tool takes hours?
13. That very soon high speed steel may be unobtainable?
14. That if you convert your solid forged tools into tool holder cutters at a trifling expense for reduction you make yourself independent of the advancing market?

**ANALYZE—ANSWER—ACT**



Western Office and Warehouse : 40 So. Clinton Street, Chicago, Ill.

Catalogue sent upon request.





# SaBeN Extra

## HIGH SPEED STEEL



*The most economical and  
efficient steel for  
machining shells*

Manufactured by Sanderson  
Bros. and Newbold, Limited,  
Sheffield, England

**H.A. Drury Company**  
LIMITED  
Montreal and Toronto



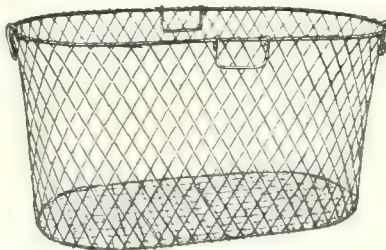
FROM  
PORT COLBORNE

**"Victoria"**  
PIG IRON

Foundry  
Soft and Strong  
Malleable

Shipments from  
The Canadian Furnace Co.

**M.A. HANNA & Co.**  
Sales Agents Cleveland



## Dipping Baskets

Our Copper Baskets will withstand **ACID**. Can be made to any shape or size. Draining facilities of our wire baskets are much greater than sheet metal construction.

**CANADA WIRE & IRON GOODS COMPANY**  
Hamilton, Ontario

## ARMSTRONG WHITWORTH OF CANADA LIMITED

MANUFACTURERS OF CELEBRATED BRANDS OF  
**HIGH SPEED STEEL & DRILLS**

**"AW"** FOR CUTTING ALL METALS  
AT HIGH SPEEDS

FOR HARD METALS — **"TYR"**  
RAILWAY & TRAM TYRES

OFFICE 22 VICTORIA SQ. MONTREAL — WORKS LONGUEUIL QUE.



Established 1840

# Firth's "SPEEDICUT" High-Speed Steel

FOR LATHE, PLANER AND BORING TOOLS, ETC.

## THE IDEAL STEEL FOR MACHINING SHELLS

Being one of the largest manufacturers of Armour-Piercing and High Explosive Projectiles we possess unusual facilities for testing the cutting capabilities of High-Speed Steel, and our improved SPEEDICUT has been elaborated after many years of scientific research to meet the demand for a steel of the highest efficiency.

It is sold in Annealed Bars and Disks.

High-Grade Tool Steel for Every Purpose.  
The Largest Stock in Canada.

### Thos. Firth & Sons, Limited

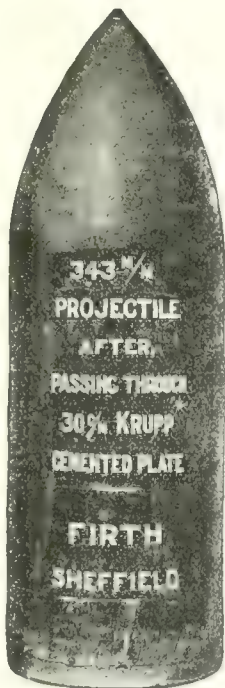
Norfolk Works and Tinsley Works  
SHEFFIELD, ENGLAND

Works also at Riga, Russia; McKeesport, Pa., and Washington, D.C.

Canadian Warehouses

507 St. Paul Street, MONTREAL  
179 Adelaide St. W., TORONTO

J. A. SHERWOOD,  
Canadian Manager



Weight 1400 lbs.



13 1/2 inches Dia.

## STEEL CASTINGS

WE MANUFACTURE  
Adamantine, Chrome, Manganese and Nickel Steel Castings  
ANNEALED AND UNANNEALED  
NONE TOO LARGE FOR US TO HANDLE.

## MACHINE MOULDED GEARS

Any size up to 18 feet in diameter,  
without the use of patterns.

### Hull Iron & Steel Foundries LIMITED

Head Office and Works at HULL, P. Que.  
Branch Office at Montreal, P. Que.

TRADE MARK



If what you want is not advertised in this issue consult the Buyers' Directory at the back.



# Brass, Phosphor, Bronze, Copper and Aluminum Castings

We have the largest Jobbing  
Brass Foundry in Canada.  
Can make prompt delivery.

*Tallman's reputation is in the goods.*

**Tallman Brass & Metal Co.**  
**HAMILTON, ONT.**

# SMOOTH-ON

TRADE MARK—REG. U.S. PAT. OFF.

## Iron Cements

Positively stop all leaks of steam, water, fire or oil, in iron, steel or concrete. They are easy to apply, harden quickly and make permanent repairs, proved by years in use.

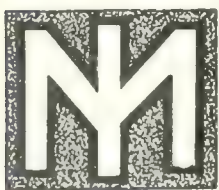
Every engineer should have a copy of our instruction book.

**Smooth-On Mfg.  
Company**

Jersey City, N. J., U. S. A.

Send for New  
No. 15 Illustrated Instruction Book

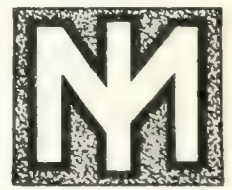
# MALLEABLE IRON



Trade Mark

## Castings

*Any Size—From Ounces Up*



Trade Mark

We make all kinds of Malleable Iron Castings, and all of the highest quality.

Our years of experience assure you the best service and castings that are satisfactory in every particular.

WRITE us about your requirements.

**International Malleable Iron Co., Ltd., Guelph, Ont.**

*The advertiser would like to know where you saw his advertisement—tell him.*



# No, Stevens' Stopper won't stop a train, but it will stop the blow hole in a defective casting so that you cannot find it.

In this way, it helps your bank account. The casting that otherwise would have to go to the scrap heap can be converted into good coin of the realm.

Same color as the rest of the casting. Doesn't look like a blue patch on Casey's faded overalls.

*How to use Stevens' Stopper, or Circle Cement:*

Stevens' Stopper is a fine powder, used with a little water and made into a paste—the hole is easily filled with a putty knife or trowel. It takes anywhere from two to twenty-four hours, depending upon the size of the patch, for the filler to become as hard as the casting itself. When rubbed with a file it shows the color of the casting, hence it is the best filler and the one thing that saves your castings, and that means the saving of your dollars.

Another thing—I do not ask a fancy price for it.

A pound will save many dollars' worth of castings. Put up in 5-lb., 10-lb., and 25-lb. cans.

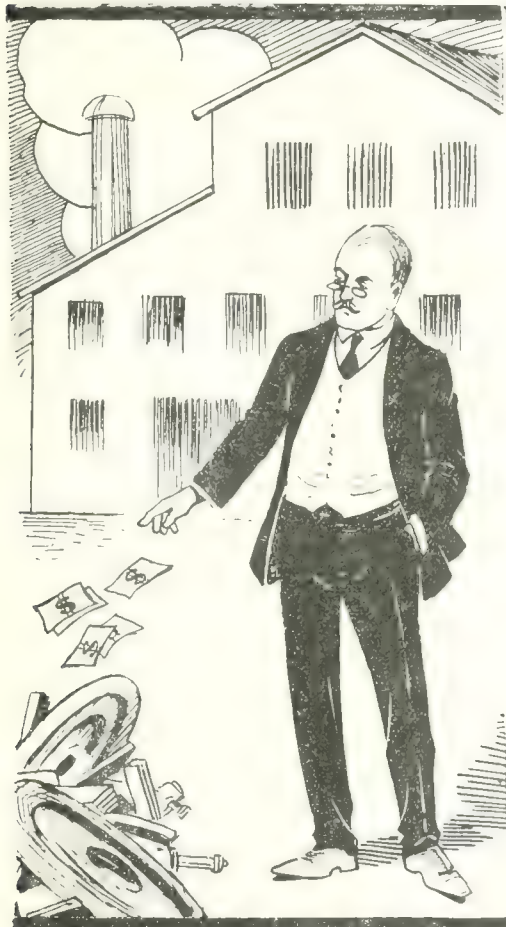
## FREDERIC B. STEVENS

Manufacturer of  
Foundry Facings and Supplies, Buffing Compositions  
and Platers' Supplies

Corner Larned and Third Sts. DETROIT, MICH.

### BRANCHES

WINDSOR, ONTARIO, 20 PITT STREET  
INDIANAPOLIS, IND., 138-140 SOUTH DELAWARE STREET



## Would You Think of Throwing Dollars on Your Scrap Heap?

### *Certainly Not!*

Why then scrap castings that cost dollars to make just because of blow holes, sand holes, etc., when by using

## SHELTON METALLIC FILLER

you can eliminate these defects and the expense of make-overs? You will not be delayed in filling orders. You will have no dissatisfied customers and no lost business.

Shelton Metallic Filler becomes part of the casting itself, is durable and can never be detected.

**DON'T SCRAP ANOTHER DOLLAR BY SCRAPPING CASTINGS.**

The fact that Shelton Metallic Filler has been used by many of America's leading manufacturing plants for years proves its efficiency.



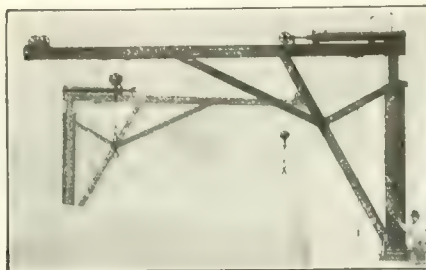
## SHELTON METALLIC FILLER CO.

DERBY, CONN.

Agents: Webster & Sons, Limited, 31 Wellington St., Montreal

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

## IDEAL FOR CRANE ELEVATOR OR OVERHEAD SYSTEM



CURTIS POWER JIB CRANES

WRITE FOR  
CATALOG  
A-1

## CURTIS AIR HOISTS

### OR REGULATABLE AIR CYLINDERS

are virtually straight line motors, capable of the widest application to shop and industrial requirements.

FOR GENERAL HOISTING, they are superior to electric motors, are cheaper, more reliable, simpler, and have lower maintenance cost.

FOR DELICATE HOISTING, as for instance,

### DRAWING PATTERNS—SETTING CORES—POURING METAL

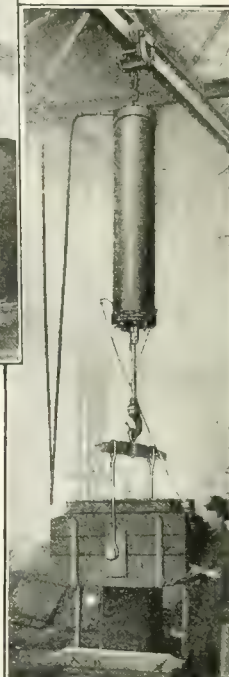
and machine shop and foundry SERVICE GENERALLY. They start or stop as slowly and gently as you please, absolutely without jerk or jar. Any speed operator desires. Will hold the load at any point of the lift and cannot drop load, even should air line break or air supply fail.

If you have hoisting or other problems, requiring hoists, aircompressors, cranes, pneumatic or hydro-pneumatic elevators, sand blasts, or overhead trolley systems, give our Engineers an opportunity to help you. Their advice will cost you nothing.

WRITE FOR CATALOG 62 AND NAME OF NEAREST CANADIAN AGENT.

**CURTIS PNEUMATIC MCHY. CO.**

1585 Kienlen, St. Louis, Mo.  
New York Office: 531 F Hudson  
Terminal Building



## ONE MAN can do as much trucking with this ELEVATING TRUCK as several men with several ordinary trucks

IT EFFECTS ENORMOUS SAVINGS IN TIME AND LABOR IN HANDLING SHELLS OR ANY OTHER FACTORY PRODUCT WHERE NUMEROUS OPERATIONS ARE REQUIRED.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed and with it the loaded platform, at the same time automatically locking it in its raised position. When hauled to the desired position the button is pressed and the handle is raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move at the platform.

Raising and lowering of the Truck can be operated with one hand only.

—can be raised or lowered at any angle.

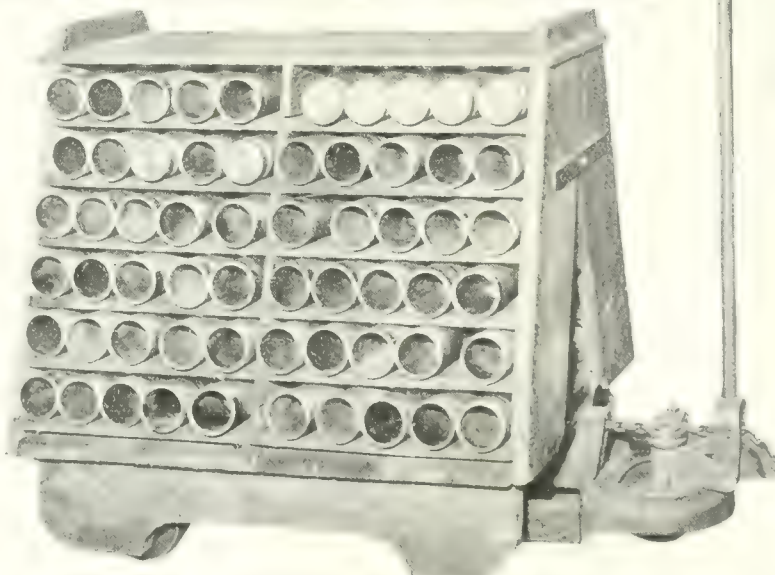
We also manufacture Loading Funnels, Ball-Bearing Tightening Nuts, Belt Driven Loading Vibrators, Bench Vises and Presses with attachments for pressing in band fixtures, especially adapted for the manufacture of 18 pr. Shipping Shells.

We shall be pleased to submit prices and give any particulars required.

**The Chapman Double  
Ball Bearing Co.**  
of Canada, Limited

339-351 Sorauren Ave.,  
Toronto, Canada

TRANSMISSION BALL BEARING  
COMPANY, INC.  
1407 West Ave., Buffalo, N.Y.



*The advertiser would like to know where you saw his advertisement—tell him.*



# CUT GEARS

*Theoretically Correct*

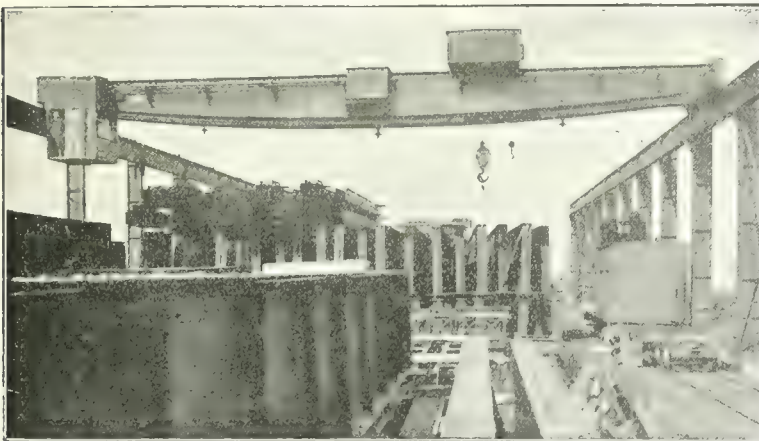
PROMPT SERVICE

**ROBERT GARDNER & SON  
LIMITED**

52 NAZARETH ST., MONTREAL, P. Q.

**RAWHIDE**

**OR METAL**



## Electric Travelling Cranes

(Direct or Alternating Current)

## Steam and Electric Derricks

(Stationary or Travelling)

Up-to-date design. Built for fast, continuous service.

ACCESSIBILITY—DURABILITY.

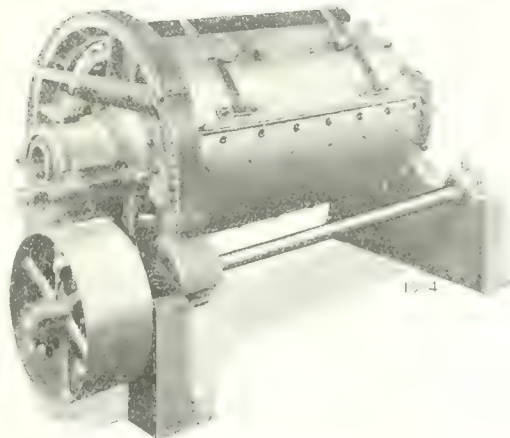
**Dominion Bridge Company, Limited**

MONTREAL

## Complete Cleaning Room Outfits

Since taking over the business of the Central Iron Works and making arrangements with the American Sandblast & Machy. Co. for the manufacture of its sandblast equipment, we are in position to furnish complete cleaning room outfits.

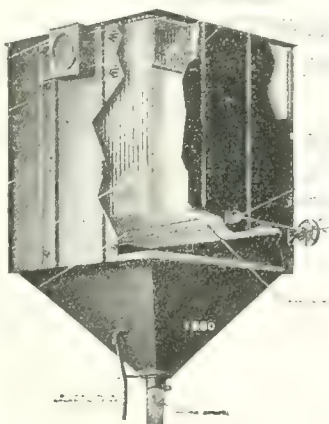
We solicit your inquiries.



Type "A" Tumbling Barrel.

**COMPLETE FOUNDRY EQUIPMENT  
CRANES OF ALL KINDS**

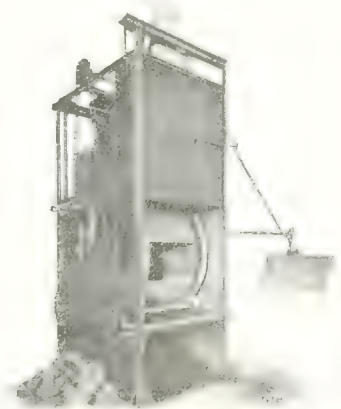
*Send for Catalog.*



Type "C" Dust Arrester.

**WHITING  
FOUNDRY EQUIPMENT CO.  
HARVEY-ILL. U.S.A.  
CHICAGO SUBURB.**

Tumbling Barrels  
Dust Arresters  
Exhaust Systems  
Water Cinder Mills  
Brass Cinder Mills  
Sand Blast Rooms  
Sand Blast Table  
Machines  
Sand Blast Barrels  
Sand Separators, etc.



Revolving Sand Blast Barrel.



# FOR HEAVY DUTY

THE MORRISON ELECTRIC ENG. CO.

Amsterdam, N. Y.,

February 8th, 1915.

Gentlemen:

I have used Magnolia Metal over fifteen years and as a matter of fact I know of no other metal that will compare with it for **Heavy duty** on small surfaces where speed is required.

Yours respectfully,

THE MORRISON ELECT. ENG. CO.

A. H. Morrison.

CITY OF FORT WORTH  
WATER WORKS DEPARTMENT

Forth Worth, Texas,

February 15th, 1915.

Gentlemen:

I use Magnolia Anti-friction Metal in any and all places where babbitt metal is required and it has never failed to give satisfaction. I have to-day used this metal in repairing a heavy bearing on one of our large Air Compressors.

Yours truly,

J. W. Turnpaugh,

Chief Engr. Water Works.

## PRACTICAL ENGINEER POCKET BOOK:

1915 Edition. Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the low price of 40c post paid.

Address Montreal Office.

SOLD BY LEADING DEALERS EVERYWHERE OR BY

## MAGNOLIA METAL CO.

OFFICE AND FACTORY:

225 St. Ambroise St.

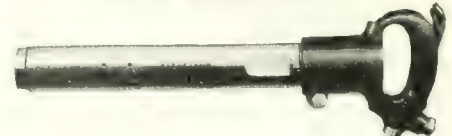
MONTREAL

## CLEVELAND RIVETING, CHIPPING, CALKING AND BEADING HAMMERS

MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET



Cleveland Riveters are made in 20 styles and sizes with driving capacities of  $\frac{1}{4}$ -in. to  $1\frac{1}{2}$ -in. rivets in Boilers, Tanks, Stacks, etc.



They have an enviable record for durability and economy in service.



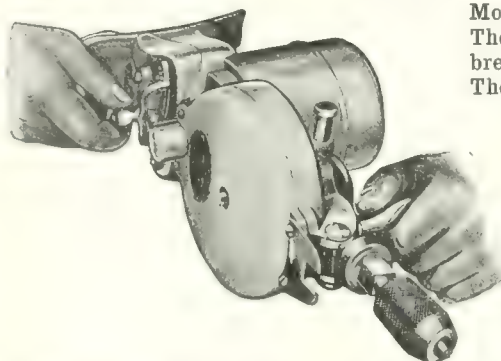
## CLEVELAND CHIPPING HAMMERS

are made in 20 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil and are practically dust-proof.



In stock: Riveting and Chipping Hammers, Air Drills, Corner Drills, Sand Rammers, Portable Grinders, Bowes Couplings, Chisels, Rivet Sets, etc.

## PORTABLE ELECTRIC DRILLS

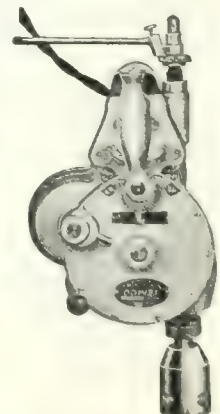


Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.

**Cleveland Pneumatic Tool Co.  
of Canada, Limited**

80 Duchess Street, - Toronto, Ont.



*The advertiser would like to know where you saw his advertisement. Tell him.*





*No. 14 is probably the one you would be most interested in, but both will be sent free if you want them. Write today for copies.*

**Morse Chain Company                      Ithaca, N.Y.**

*Our nearest office can supply  
your copy quickest.*

OFFICES:

NEW YORK . . . . . 50 Church St.  
BOSTON . . . . . 141 Milk St.  
CHICAGO . . . . . Merchants L. & T. Bldg.  
PITTSBURGH . . . . . Westinghouse Bldg.  
CLEVELAND . . . . . 421 Engineers Bldg.  
DETROIT . . . . . 735 Dime Bank Bldg.  
SAN FRANCISCO . . . . . Monadnock Bldg.

REPRESENTATIVES:

St. LOUIS . . . . . Morse Engineering Co.  
   Chemical Building  
MINNEAPOLIS . . . . . Strong-Scott Mfg. Co.  
   413 Third Street, South  
ATLANTA . . . . . Earl F. Scott, M. E.  
   702 Candler Building

Morse Chain Company (Catalogue Dept.)      DS-2

Gentlemen: Without obligation, please send me a copy of  
your publication "A Chain of Evidence" Number \_\_\_\_\_

Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

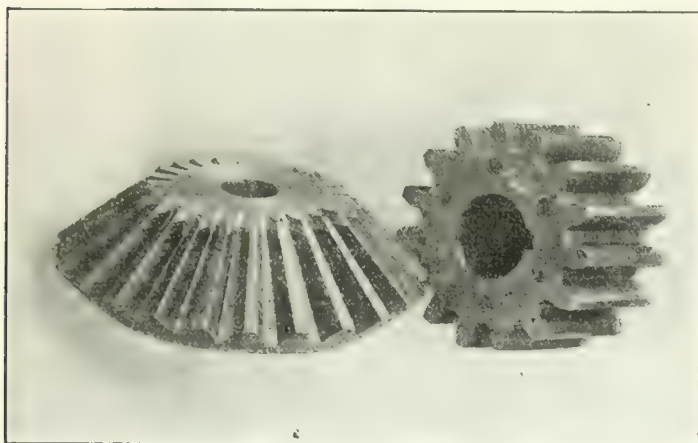
City & State \_\_\_\_\_

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

# GEARS

CUT  
GEARS

Raw Hide Pinions are  
Silent at High Speeds  
and, when Well Made, are Durable



WE CARRY A GOOD STOCK OF RAWHIDE  
AND CAN SHIP PROMPTLY

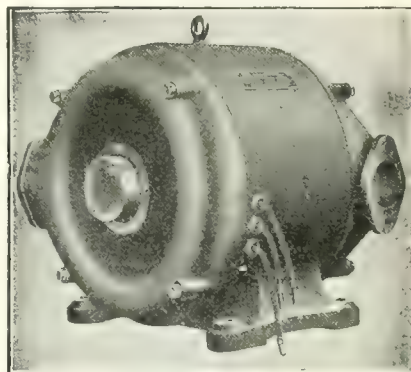
**The Hamilton Gear & Machine Co.**  
Cor. Concord and Van Horne, TORONTO

## The Lancashire Dynamo & Motor Company, of Canada, Limited

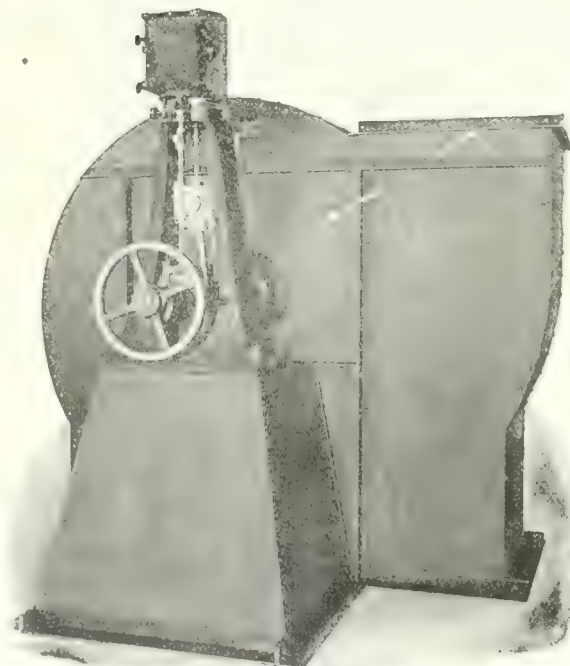
107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS'. { INSTRUMENTS  
RECORDING GAUGES



PIPE VENTILATED A.C. MOTOR  
FOR VERY DIRTY PLACES



## HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

**SHELDONS LIMITED, Galt, Ontario**

Toronto Office: 609 Kent Building.

#### AGENTS:

Messrs. Ross & Co., Ltd., 41 St. James St., Montreal, Que.  
Messrs. W. A. G. Co., Ltd., 259-261 Stanley St., Winnipeg, Man.

Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.  
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.

*The advertiser would like to know where you saw his advertisement—tell him.*



# "Sirocco"

## Summer Cooling by the

*"Sirocco"*  
TRADE MARK

### Fan System

Operatives to work at their highest point of efficiency must be comfortable.

The atmospheric condition of your plant plays a most important part in this connection. The "Sirocco" System will provide for a Cool, Comfortable atmosphere in Summer, and a warm, comfortable atmosphere in Winter, with Positive Ventilation in all seasons.

Let our Engineers tell you how "Sirocco" could be adapted to your plant. No cost for this service. Interesting literature on "Sirocco" will be sent at your request.

CANADIAN *Sirocco* COMPANY  
LIMITED

WINDSOR, ONTARIO.

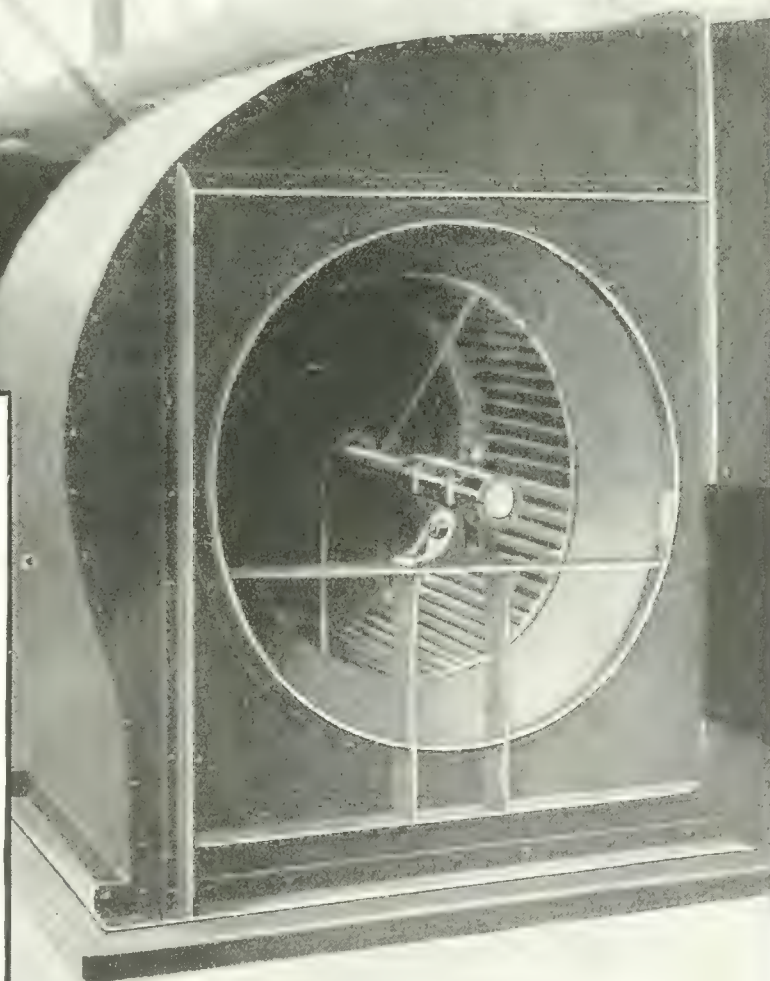
#### Sales Engineers:

S. S. Clarke,  
605 2nd St.,  
Calgary.

A. M. Nichol,  
301 McGill Bldg  
Montreal.

W. W. Hicks,  
567 Banning St.  
Winnipeg.

Canadian Sirocco Co., Ltd.,  
604 Credit Foncier Bldg.,  
Vancouver.







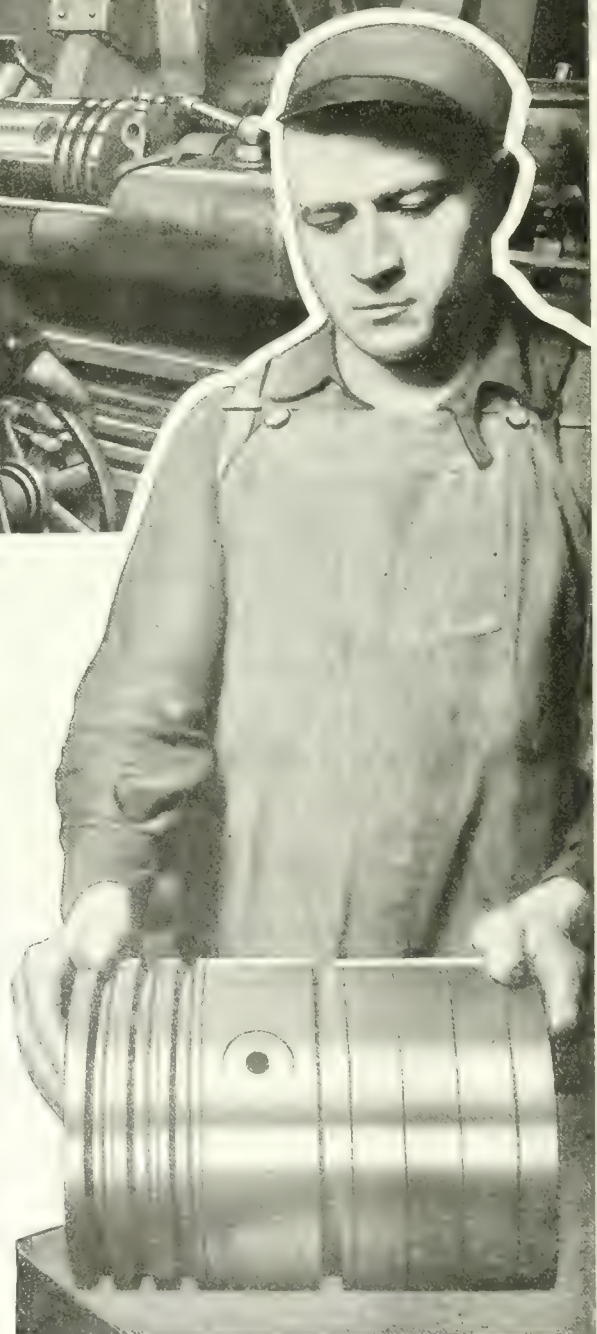
# NORTON GRINDING

## Big Pistons

**20 Minutes Each**

**Norton Grinding Machine and Norton Methods** rather monopolize the grinding situation at the plant of the John Lauson Manufacturing Company, New Holstein, Wis. This concern manufactures gas engines—the best engines modern methods can produce. Grinding naturally plays an important part in the work. For example: These pistons are  $7\frac{1}{4}$ " diameter by  $9\frac{3}{8}$ " long. 0.025" stock is left for grinding. The wheel is 24" x 2" and is run at 950 R. P. M. Allowable variation is 0.002" and production three pistons per hour—one every 20 minutes.

Whenever Lauson adds a grinding machine it is a "NORTON." Speaks well for these machines, doesn't it?



**"The Norton Limit is the Grinding Limit"**

## Norton Grinding Company, Worcester, Mass., U.S.A.

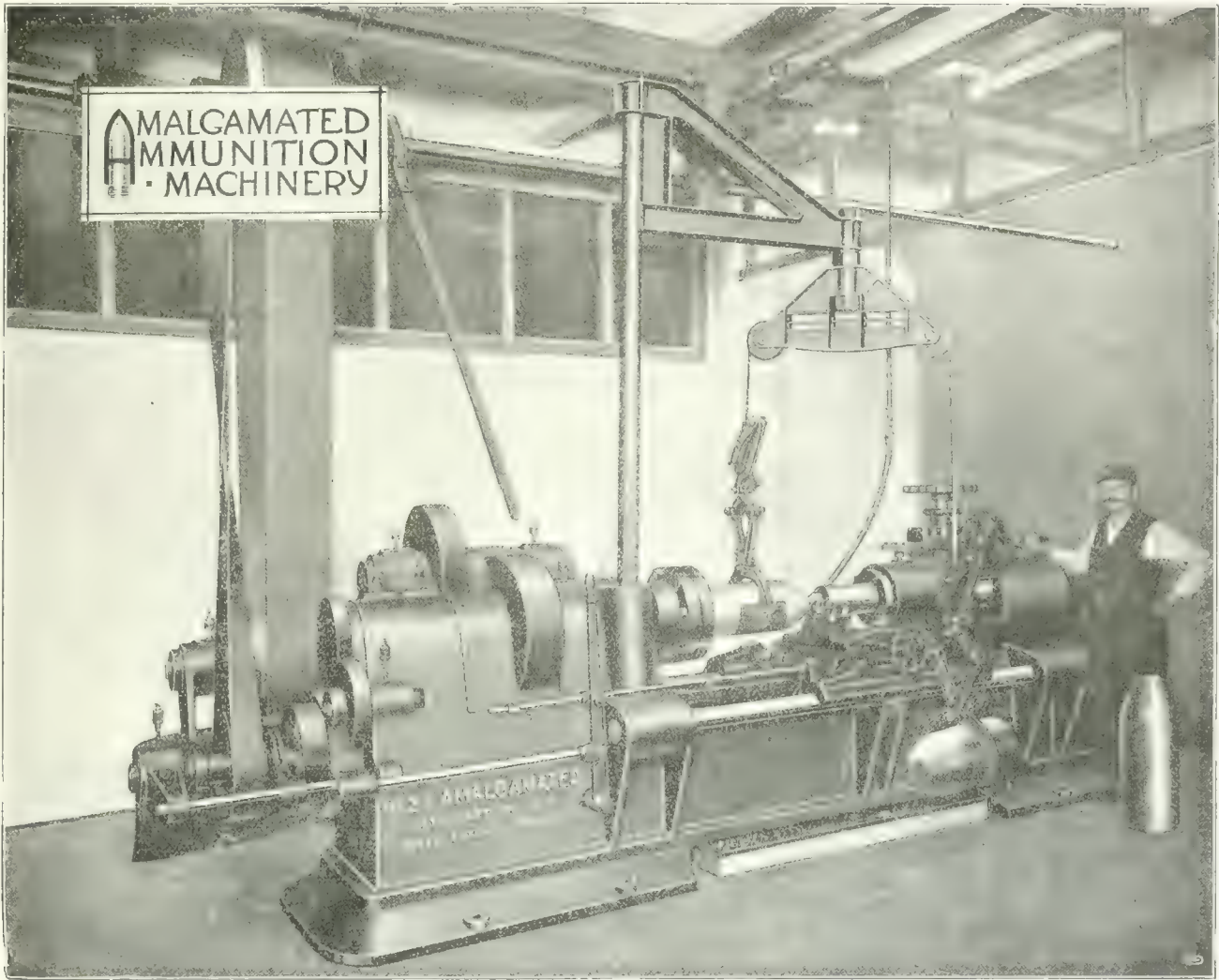
CANADIAN AGENTS:

**THE CANADIAN FAIRBANKS-MORSE CO., LIMITED**

St. John, N.B., Montreal, Ottawa, Toronto, Winnipeg, Saskatoon, Edmonton, Calgary, Vancouver, Victoria.  
468N

*The advertiser would like to know where you saw his advertisement - tell him.*





Amalgamated No. 21 Turning Machine Roughing British 9.2 inch H.E. Shell

# FOR THE BIG (and little) SHELLS

## AMALGAMATED AMMUNITION MACHINERY

**Efficiency, Speed, Strength, Simplicity and  
Guaranteed Quick Deliveries.**

Amalgamated Ammunition Machinery comprises a complete line of machines in two sizes for all roughing and finishing operations on all sizes of Shrapnel and High Explosive Shells whether made from forgings or bar stock. The Machines have all been especially designed for efficiency, strength and "tool progress."

A closer view of the design and very massive construction of the machines can be had from the illustration above, showing No. 21 in operation.

**In inquiring it will facilitate a full and satisfactory reply if  
you will kindly give all possible details of your requirements.**

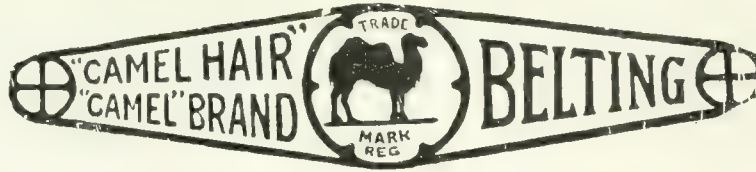
## AMALGAMATED MACHINERY CORPORATION

72 WEST ADAMS STREET, CHICAGO, U.S.A.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

# For Fifty Years

Full Stock  
1¼" to 26"

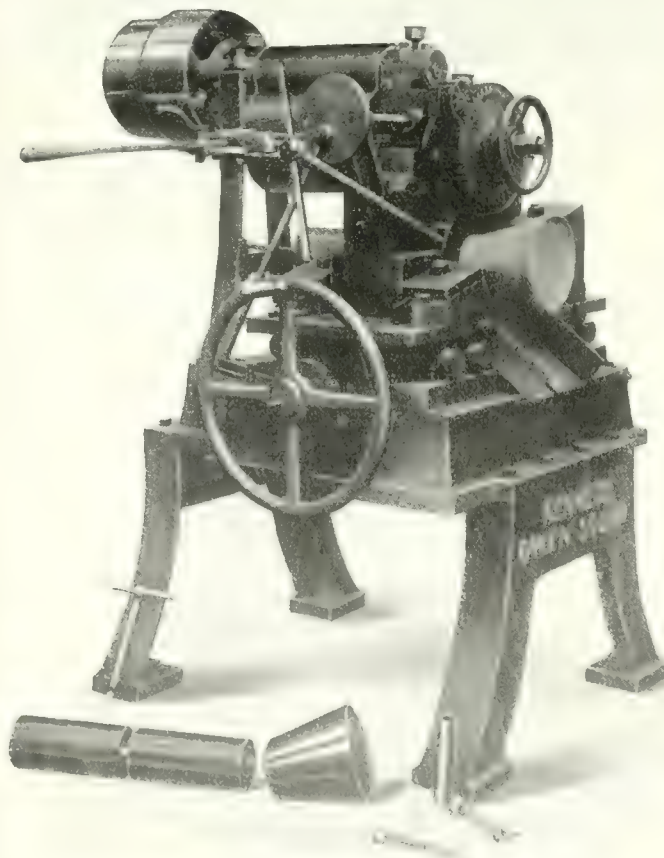


Immediate  
Delivery

Has been used on

## SHELL MACHINERY

F. Reddaway & Co., 653 St. Paul St., Montreal



## CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming  
4.5" to 9.2" Shell Blanks and  
Forgings.

Floor space approximately 4 ft.  
square.

Will cut crooked and short  
ingots. No loose collars to put  
on billets.

1 Helper to every 3 or 4 ma-  
chines.

THE  
**Wm. Kennedy & Sons**  
LIMITED  
OWEN SOUND

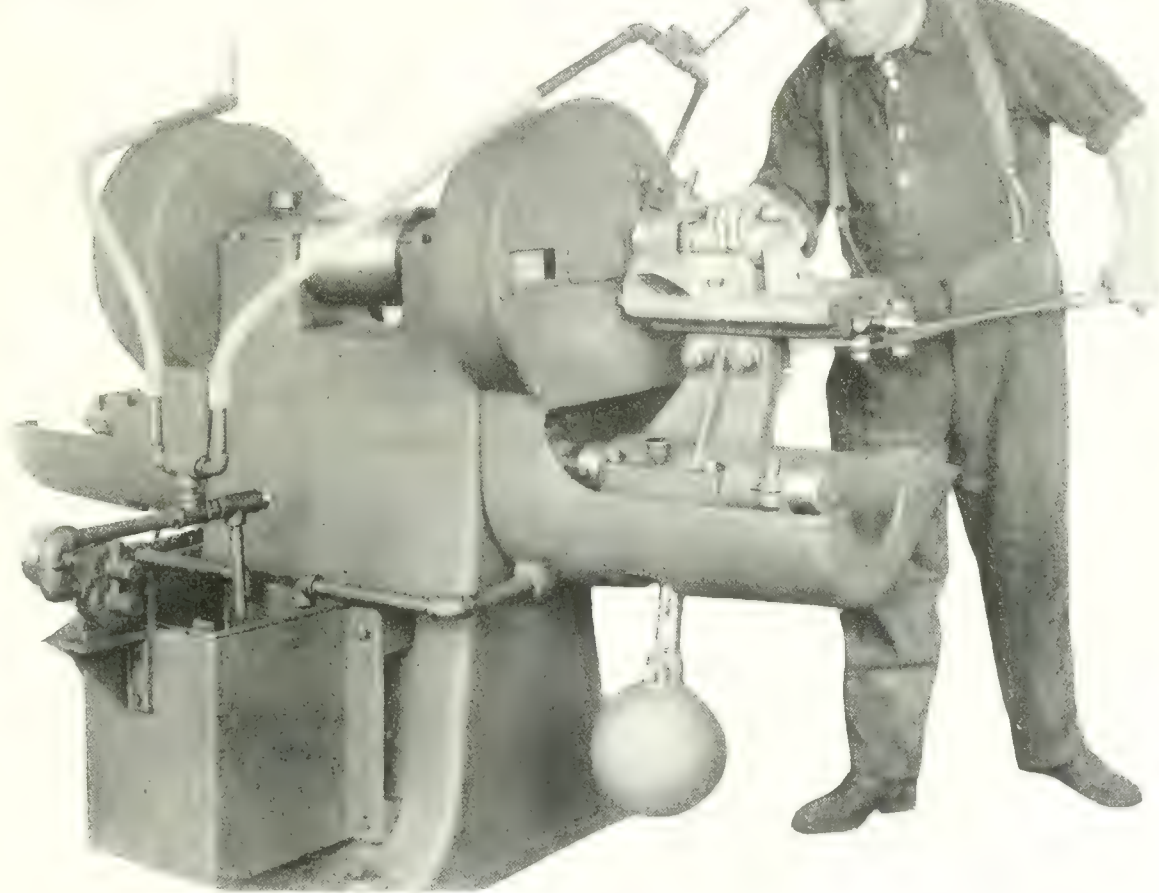
*The advertiser would like to know where you saw his advertisement—tell him.*



# GRINDING ENDS OF SHELLS

We have developed a special Grinding machine for removing the hub or centre projection which has to be removed before the shell is completed.

There are various ways of removing this stock, but production is the essential factor. Our Grinder is also used for cutting off the square or angular hubs from High Explosive Shell base plates as well as from shrapnel casings. From a grinding standpoint, the operation is the same in both cases. In some instances the hub is removed by some other process and the riveting done. It is then placed on the grinder and the balance of the base plate is removed, taking a light cut over the entire base of the shell as well.



## FEATURES

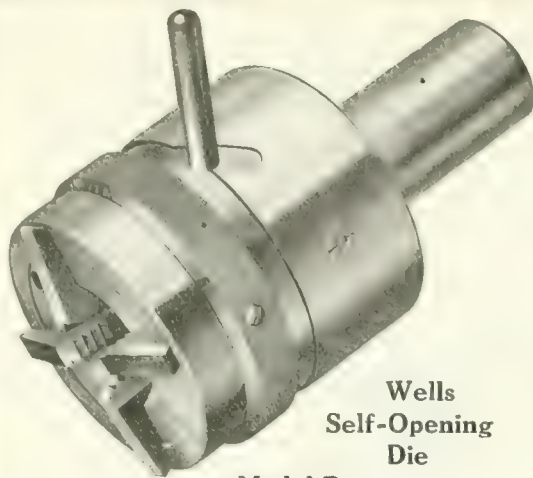
- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

The Gardner Co. also build a No. 50 Grinder which is much heavier and more powerful than the one illustrated herewith. The large grinder is being adopted by manufacturers of 6" Shells for these same operations.

For further particulars write

## The Gardner Machine Company, Beloit, Wisconsin

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



Wells  
Self-Opening  
Die  
Model B.

We want to send you the booklet describing the different models. Are you willing to try the W.S.O.D. in your shop under your own conditions?

# W. S. O. D.

We call it the "universal die" because there is not a screw-cutting machine manufactured on which it will not fit.

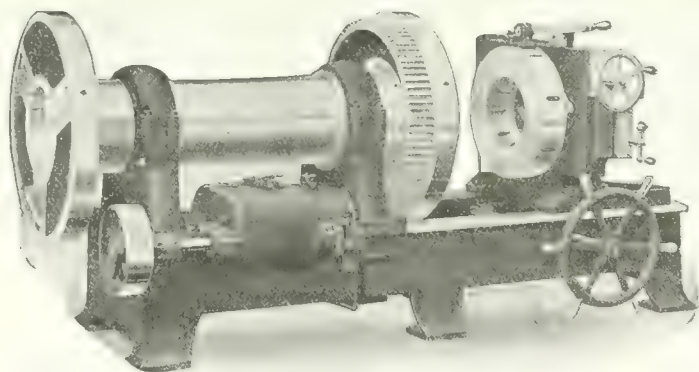
Its very appearance attracts and holds you—you instinctively know it will do the work—and it will.

It is the simplest and most efficient of all automatic opening die heads.

## WELLS BROTHERS COMPANY OF CANADA, Limited

GALT - ONTARIO

Sales Agents:  
The Canadian Fairbanks-Morse Company, Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.



### SHOP REQUIREMENTS

are such that the most modern machinery is needed, built for long, hard service. We know those requirements and make our machines to stand the wear and tear which the service demands.

When deciding on a new machine it is well to con-

sider what it will be worth in ten or fifteen years, and what it will cost to keep it in good running order during its natural life. Endurance is only one of their good points.

*Send For The Catalog*

**Bignall & Keeler Machine Works,**

Edwardsville, Ill.

The Canadian Fairbanks-Morse Co., Ltd.

Sales Agents for Canada

Montreal

St. John

Toronto

Winnipeg

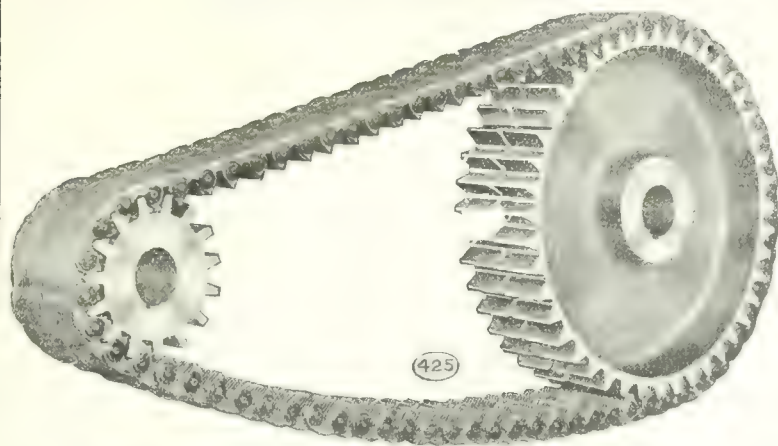
Calgary

Saskatoon

Vancouver

Canada's Departmental House for Mechanical Goods





### RENOLD PATENT SILENT CHAIN QUIET—EFFICIENT—DURABLE

You cannot get new machines quickly now to increase your production. Why not get part of the needed increase by improving the transmission? The Renold Silent Chain Transmission has a maintained Efficiency of over 98%—it permits of short centres and provides maximum production at minimum cost.

Write and let us send a representative to give full particulars.

Sole Canadian Agents

**JONES & GLASSCO (Reg'd) Engineers**

Branch Office  
TORONTO

St. Nicholas Bldg.  
MONTREAL

## "Armour-Plate" Punches and Shears

*Now Made in Canada*

For great strength, light weight, compactness, and capacity for large production—there is nothing to compare with Canadian "Armour-Plate" Punches and Shears, both hand and power.

Write for Catalog 179-16

**Canadian Blower and Forge Co., Limited**

BERLIN, ONTARIO

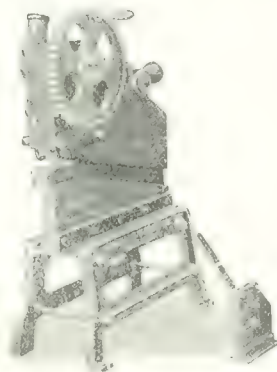
ST. JOHN

MONTREAL

TORONTO

WINNIPEG

VANCOUVER



# SNAGGING WITH Crystolon Wheels

Clean Cutting



Cost Cutting

Fast Cutting

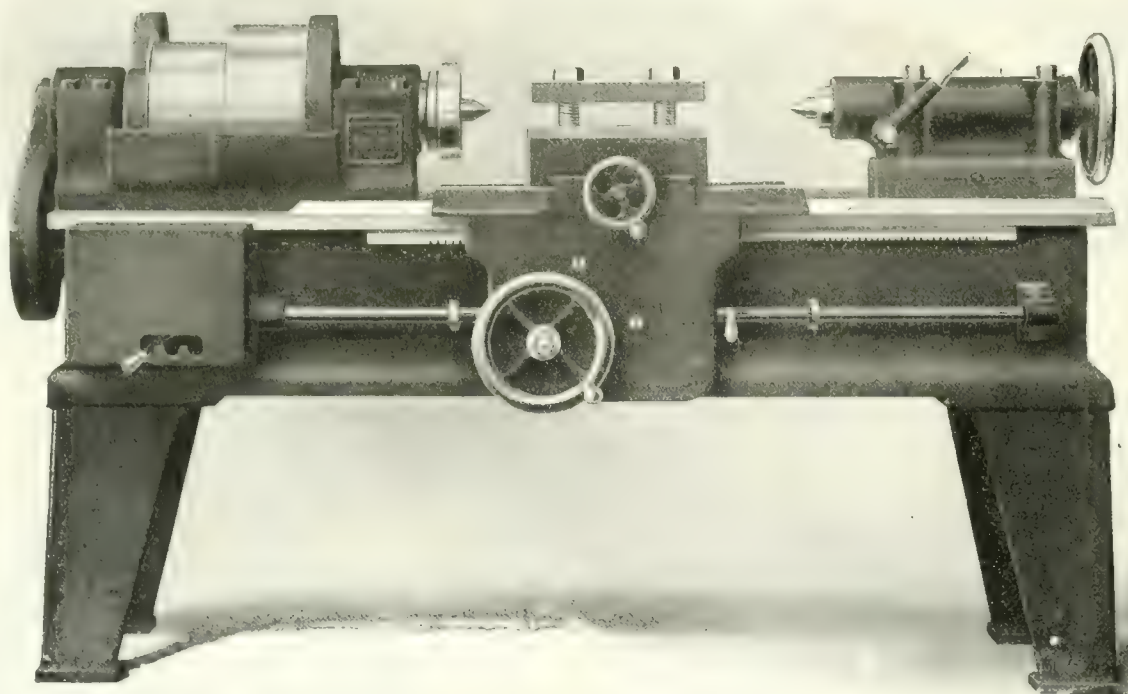
How to get increased production—get it cheaper—and get it without adding expensive equipment—is the problem the up-to-date foundryman is facing, and a problem that is being solved by users of

## NORTON CRYSTOLON GRINDING WHEELS

For truing up castings, for removing gates or fins, for snagging small parts before finishing, and for many other odd foundry jobs where grinding is desirable, Crystolon Wheels give satisfaction. They are especially adapted to work on cast iron, brass, bronze, aluminum and other materials of like physical characteristics.

**NORTON COMPANY, Worcester, Mass., U.S.A.**

Canadian Agents: THE CANADIAN FAIRBANKS-MORSE CO., LIMITED Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. ANDREWS & SON, Ltd., Port Huron, Mich., U.S.A.



## Do You Want a Lathe for Your Rush Work?

Here is a lathe for turning and boring projectiles ranging from 3 to 6 inches in diameter. It can also be used for general manufacturing work. It is a 24" lathe cut down to swing 16", adding to the rigidity and convenience of operation. Can be operated by unskilled labor.

### Specifications

Dia. of spindle .....	5"
Swing over bed .....	16"
Swing over carriage .....	10"
Distance between centers .....	21"
Ratio of back gearing .....	6.25 to 1
Diameter of tailstock spindle .....	3 1/2"
Travel of tailstock spindle .....	8"

**Large diameter two-step cone for 6" double belt. Steel gears.**

Let us give you full details on this lathe. It will prove a money-maker for you on your work. Good deliveries still available.

## The Canadian Fairbanks-Morse Co., Limited

St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Winnipeg,  
Saskatoon, Calgary, Edmonton, Vancouver, Victoria

Canada's Departmental House for Mechanical Goods

*The advertiser would like to know where you saw his advertisement—tell him.*



# From Ironfounding to 4.5 in. Howitzer Shell Production

Staff Article

*That the manufacture of high explosive shells can be successfully undertaken by practically any metal working enterprise when backed by an energetic and resourceful staff is here indicated. Particular note may be made of the fact that the entire plant staff of molders, core-makers, helpers, etc., has been transferred to the new industry of shell-making.*

THE shell manufacturing plant which we here feature is a development arising from the transformation of part of a general iron-foundry into a machine shop, and serves to further indicate the wide variety of enterprise that has been shown in taking advantage of and meeting the munitions demand. The 4.5 in. howitzer type shell is the particular product, but as the procedure adopted is more or less similar to that practised in plants

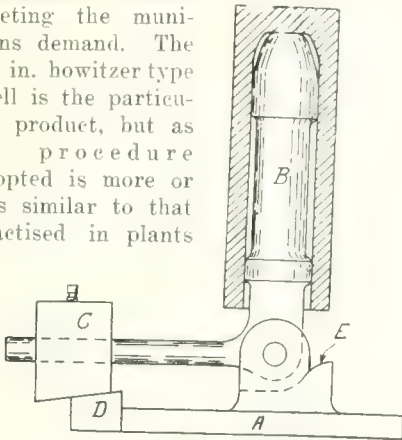


FIG. 1. CENTERING JIG

which we have previously described, a general outline only of the operations is given; the methods and devices original to the establishment are, however, dealt with in more or less detail.

## Cutting-off and Centering

Two "Hall" cutting-off machines are

used for cutting the rough shells to length. These machines are placed in a shop separated from the main building. After the forgings have been trimmed to the desired length, they are taken to a drill press and the base centered.

The jig used for this operation is shown in Fig. 1. The base A is secured to the drill table in a position that brings the post B directly in line with the drill spindle. Secured to the handle of the L piece B is the adjustable block C, which acts as a balance weight and also as a gauge, as the lower surface is shaped at an angle and rests upon the beveled edge of the boss D. Alignment of the post B with the centering drill can thus be attained by adjustment of the block C. The stop E allows the post B to remain at an angle while the shells are being put in place or being removed.

## Rough Turning

Rough turning is performed on three 26-inch Boye & Emmes lathes. The shells are placed between a short tapered rose arbor, which fits into the open end and the tail centre, being forced on firmly by the pressure from the tail stock spindle.

## Boring

The boring operation shown in Fig. 2 is done on three 26-inch Boye & Emmes

engine lathes. A special feature of this operation is the absence of turret or tool vibration. This firm, when entering the shell business, had great difficulty in obtaining the necessary machinery on reasonable delivery, and were forced to install machinery of somewhat larger

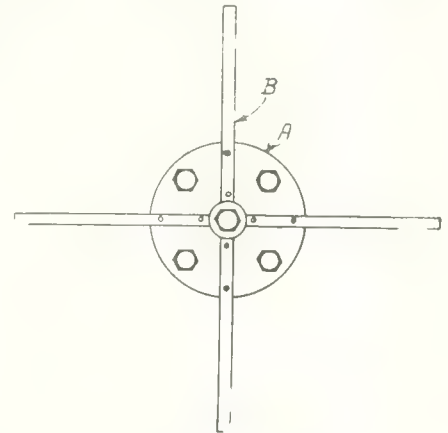


FIG. 3. SHOWING INCREASED LEVERAGE FOR HAND WHEEL

range than necessary. However, this apparent objection has proved to be more of an advantage than otherwise, as greater rigidity and increased output have been the result.

As shown in Fig. 2, special four-sided turrets are used. In the designing and the construction of these, the superintendent of the shell shop (formerly superintendent of the iron foundry) gave particular attention to the strength and stability of the device. The boring bars and cutting tools are so designed and arranged that little or no movement is observed when in operation. A small hole is drilled through the bars from the front end near the cutting tool to a location just in front of the turret face. A small piece of tubing is inserted in a hole drilled to meet the first hole, and the cutting compound is forced through this hole to the bore of the shell from the under the shrapnel.

Another noticeable feature on this operation is the absence of the customary steady head supporting the shell chuck. The increased diameter of lathe spindle and added strength renders the steady rest unnecessary. The output of these machines is, on an average, 62 shells each ten hours. An arrangement similar to Fig. 3 is secured to the traverse hand wheel on the apron to ob-

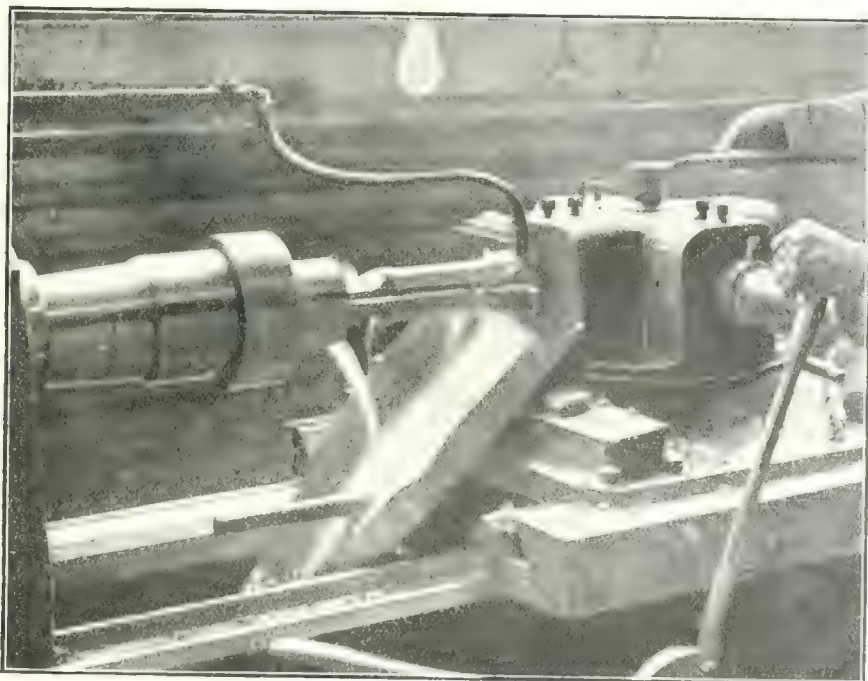


FIG. 2. BORING 4.5 SHELLS ON 26 IN. BOYE & EMMES LATHE

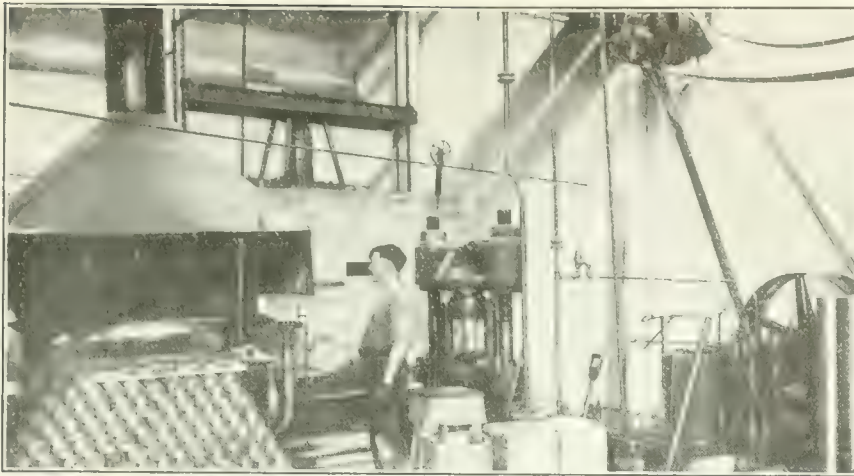


FIG. 4 NOSING EQUIPMENT FOR 15 IN SHELLS

tain greater leverage to force the tool when forming the base contour.

#### Nosing the Shells

The nosing of the shells, which follows the boring operation, is carried out in the usual manner. The shells are placed in the Mechanical Engineering Co. furnace, shown to the left in Fig. 4. They are heated to a temperature of about 1,550 degrees F., and placed in the 150-ton Boomer & Boschert hydraulic press, which is supplied by power from the three-cylinder hydraulic pump, shown to the right of Fig. 4. The pump was built by the Canadian Boomer & Boschert Press Co., of Montreal. The nosing die is made of tool steel and encased by a water jacket. After nosing, the shells are placed in powdered lime to anneal for further machining. The furnace is also used to anneal the base discs when these through any cause are difficult to machine.

#### Boring and Threading Nose

Two 26-inch Boye & Emmes engine lathes are used for boring the shell nose.

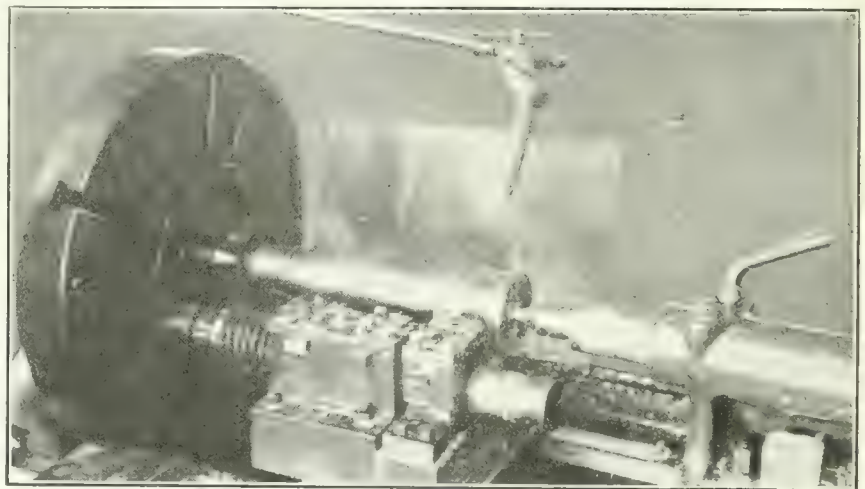


FIG. 7 GROOVING AND WAVING ON 22 IN "McDOUGAL" LATHE



FIG. 5 FINISH TURNING AND PROFILE

Special turrets have been made by the St. Lawrence Iron Foundry, Montreal, and placed on the saddle of these machines. The shell is held in a chuck similar to those described in previous articles, and the cycle of operations is boring, inside profile, face and chamfer end, recess and tap. Tapping is performed with a "Murehey" collapsing tap.

#### Finish Turn and Profile

The diameter and profile are finished on two Boye & Emmes 26-inch engine lathes, the operation being shown in Fig. 5. An auxiliary saddle and compound rest is placed on the lathe saddle, and two tools are employed in removing the metal, one operating on the parallel portion and the other on the profile by means of a cam and weight.

A plan of the arrangement is shown in Fig. 6. The tool E held in the tool-

post on the compound rest D, is used on the profile of the shell. Secured to the cross slide is the bracket F which carries the hardened steel piece G and is kept in contact with the cam H by means of the weight L supported by cables passing over rollers shown, and secured to studs in the side of the bracket F.

Adjustment of tool E is obtained by the movement in or out of the compound rest D. The cam H is bolted to the bar I, which is secured to the brackets J. These brackets are bolted to the lathe bed below the run of the lathe saddle. Added stability is given to the cam by the brace K, which is bolted to the bracket J at one end and the head-stock at the other.

In order that a correct profile may be produced, the cutting point of the tool E should be in line with the contact point of the piece G when a line drawn from point to point is at right angle to the axis of the shell, or lathe spindle.

The auxiliary saddle A supports the



compound rest B which carries the tool C for turning the parallel section of the shell. With this arrangement the actual traverse of the saddle necessary to complete the outside is a little over one-half the length of shell.

### Obtaining the Weight

After the shells have been finish-turned, they are weighed, and the base faced off to obtain the desired weight.

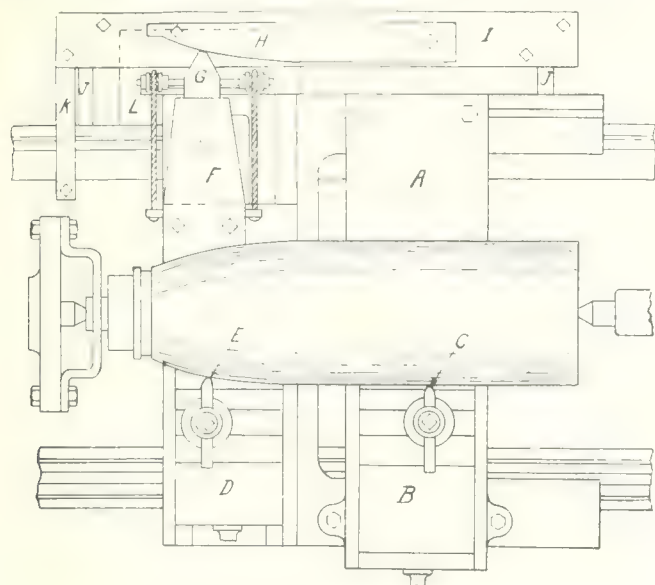


FIG. 6. PROFILE AND OUTSIDE DIAMETER FINISHING.

spring shown. The successive operating tools are set a sufficient distance in advance, so that each tool will clear the shell while the next one is working.

### Shell Support

A very handy and serviceable attachment used on this and other operations is shown in Fig. 9. The piece A is secured to one of the braces B in the bed of the lathe, and supports the shell C at the required height, thus relieving to a large extent the labor otherwise nec-

Lawrence Iron Foundry Co., Montreal. The base plates, instead of being threaded, are riveted in, as shown in Fig. 10. They are finished from the rough forging on an R. McDougall 20-in. lathe.

The brass sockets are next screwed in and turned on 18-in. Boye & Emmes engine lathes, after which the small hole for the grub screw is drilled through the brass socket and tapped.

The copper bands are pressed on in a "Fairbanks-Morse" banding press and turned in a "Jones" band turning lathe.

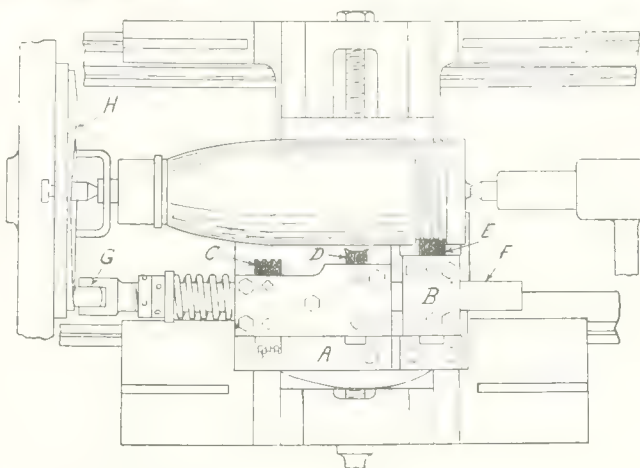


FIG. 7. GROOVING, UNDERCUTTING AND WAVING.

To calculate the required amount to face off, divide number of ounces by 72; which is the approximate weight in ounces of one inch in length of 4.5 inches in diameter.

### Groove and Wave

After the base has been faced off, the shell is taken to two 22-inch R. McDougall engine lathes, where the grooving and waving is performed. This operation is shown in Fig. 7. The various operations are all completed from the front of the shell by moving the saddle to the desired position. The device here shown was designed and constructed by the St. Lawrence Iron Foundry Co., Montreal, and is showing excellent results. An average production of 100 shells is obtained on each machine every ten hours.

A sketch of the arrangement is shown in Fig. 8. The base A of the device is secured to the cross slide, and is stationary in relation to the cross slide. This piece carries the two tools C and D. The sliding piece B carries the waving tool E.

Secured in the sliding block B and passing through the piece A is the shaft F, which carries in the forked end the roller G. This roller rides on the surface of the cam H, which is bolted to the face plate of the lathe. The desired tension is obtained by the lock nuts and

necessary in handling. The full lines show an end view, and the dotted lines a side view of the support.

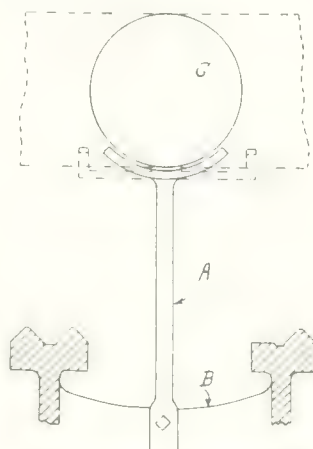


FIG. 9. SHELL SUPPORT.

### Base Plate Recess

The base and recess for base plate are finished in Boye & Emmes and R.

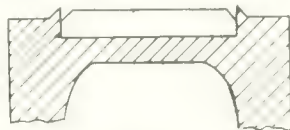


FIG. 10. ARRANGEMENT FOR RIVETING IN BASE PLUGS.

McDougall 20-inch engine lathes fitted with special turrets built by the St.

The shells are next taken to the sand-blasting room, where the bore is entirely cleaned from grease and other foreign matter in readiness for varnishing. After the varnish has been run in and out, and thoroughly drained, the shells are baked in an oven for some four or five hours.

### Painting and Crating

After the baking process, the shells are taken to the painting department to receive the final touches before crating and shipping.



**High Explosives.**—There has been a good deal of talk in the papers lately about high explosive shells. These are of two kinds—the one with thick walls, which is almost as effective as shrapnel for man-killing under all conditions, and the thin-wall, or torpedo shell, chiefly useful for the work of destroying fortifications. These latter are dangerous to handle, as they contain a quantity of high explosive, and if they burst while being fired ruin the gun and everything around it. They are lighter than shrapnel, and, therefore, require the use of different range tables. Any reluctance of the authorities to adopt a new form of thin-walled explosive shell in the middle of a big war can be well understood. The explosive used is generally picric acid or T.N.T.

# Large Shells : Production Problems and Possibilities--II.

By C. T. D.

*In preparing to undertake the production of large shells up to 9.2 in. dia., manufacturers will encounter problems of a nature altogether different from those connected with 18 pdr. shells. Automatic machinery will not be so applicable to the larger sizes, and productive ability will centre largely on such points as sequence of operations, tooling methods, etc.*

**N**EXT to having the total weight of a projectile within the specified limits, the most important requirement is that which limits the amount of eccentricity between the outer and inner surfaces. In other words, while the thickness of the walls may vary within generous limits pro-

a very large extent, thus permitting the use of unskilled labor, the mechanical skill and ability required to insure profitable and rapid production of these large shells, can be utilized to greater advantage by performing as much work at one setting as the machine is capable of. This reduces to a great extent the

on tool outfits which will enable skilled help to reach and maintain a large output of work which could not be handled by unskilled labor without constant risk of loss due to bad work, or breakage of machines through inattention.

The operations as outlined below are arranged in a number of groups, each of which can be handled conveniently on standard types of machines with such special tooling as individual makers may develop. Special purpose machines for one or more operations will be described in due course; at present all suggestions and descriptions refer to such methods as can be adopted with existing machines.

## Regarding the Operations

(Group A.) Removal of scale on the point of the forging by grinding is advisable where a rough grinding wheel is available and it should be used in preference to machining. There is no reason, however, why the point should not be cleaned off as part of operation A3, if suitable provision is made for the tool. Fig. 2 illustrates the operations referred to in group A, from which it will be seen that the use of a square tool box would allow of another tool being set up for the purpose of cleaning the nose, but the

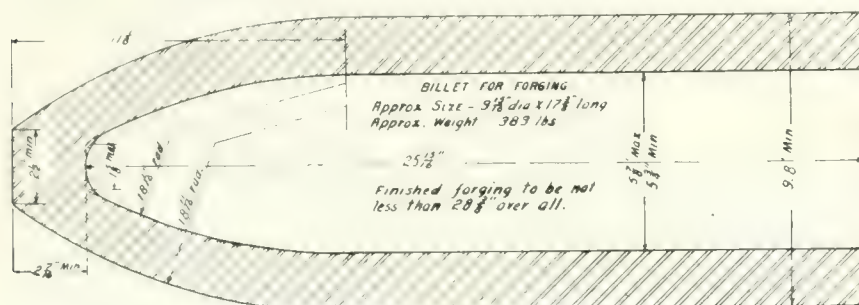


FIG. 1. FORGING SIZES FOR 9.2 IN. HOWITZER SHELL.

vided the total weight is correct, it must not be assumed that these limits can be applied indiscriminately to various portions of a particular shell.

Such a shell might easily be out of balance to a degree which in addition to causing excessive wear on the lining of the gun, would cause its behaviour during flight to be dangerously erratic, to say nothing of nullifying its effect on enemy works. The necessity of strict limitation of this error will, therefore, be evident, and manufacturers who use every possible means to produce shells perfectly machined in this respect earn a commendation which does not materialize, but is none the less merited.

## Similarity of Large Shells

The 8-in. and 9.2-in. shells differ principally in size. The methods of machining the larger shell apply equally to the smaller and the operations as outlined below are arranged with the view of using machine tools of standard types such as are already installed in plants handling products of moderate weight and dimensions. The approximate sizes of the 9.2-in. rough forging are shown in Fig. 1, the finished sizes being shown on the drawing published in the previous issue of this paper.

The number of operations included in any one group are the maximum which it is advisable to include. Where machines and men are available, operation groups may be split up, but whereas in the case of shrapnel, etc., it was possible to subdivide and simplify operations to

number of individual workers through whose hands any one shell must pass, and correspondingly reduces the possibility of loss through carelessness or lack of skill.

## Factors in Production

Efficient production, therefore, is not so much a question of having a large

OPERATION TABLE.

Operation Number	Description.
<b>Group A.</b>	
1	Grind off scale on point, forming small flat.
2	Place in expanding arbor which coats shell from inside, and position it lengthwise from inside of nose.
3	Place shell in set of spool to necessary thickness.
4	Drill centre with drill in tail stock, remove drill and adjust dead centre.
5	Rough turn body, commencing at base and travelling to point where open end of shell is cut on.
6	Cut off open end of shell to length measured from base.
<b>Group B.</b>	
1	Drill hole in nose, leaving stock for final boring.
2	Chuck by nose with outer end in steady. Nose of shell in contact with gauge stop on chuck.
3	Bore parallel portion with roughing and finishing cutters.
4	Turn interior of nose or arch.
5	Finish overall length and counter-bore. Tap base.
<b>Group C.</b>	
1	Tap nose.
2	Insert threaded driving plug, centre in nose, and common threaded plug centre in nose.
3	Finish outside to size and shape.
4	Machine and undercut groove. Wave ribs.
<b>Group D.</b>	
1	Press on driving band.
2	Machine driving band.
<b>Group E.</b>	
1	Remove service plugs and assemble base plug and nose bushing.
2	Face off base and finish bushing.
3	Enamel interior and bake.

number of different kinds of machines doing single simple operations with unskilled labor, as of having sufficient machines of fewer types, and concentrating

distressing effects of the scale on the cutting edge will be avoided where grinding is possible.

Trimming the open end is best, as



operation A 6. This operation is sometimes performed first or second, and where the number of machines is such that a lathe or cutting off machine can be operated continuously on this work, it may be done then instead of later, but the fact should not be overlooked that the time spent in chucking and removing from the cutting-off machine is a straight addition to the total time on the shell. By performing operation A 6 on the same machine as the other A opera-

the smaller sizes of shells and modifications of these can be adopted if ample power be provided for expanding the driving dogs.

The nose of the shell is now faced off to a specified distance after which the centre is drilled in the conventional manner, and the dead centre adjusted, when the operation of rough-turning the outside may be proceeded with.

An alternative method of procedure up to this point, and one which will ap-

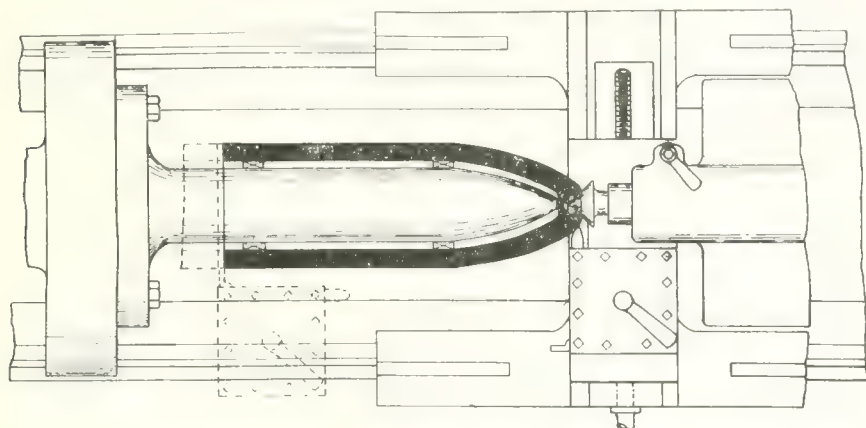


FIG. 2. ROUGH TURNING AND CUTTING OFF ON REGULAR ENGINE LATHE

tions, the time of this extra handling is saved.

Proceeding now to A 2, a lathe of ample power is necessary, as the roughing must be done in one cut if satisfactory progress is to be made. All of the power and stiffness available in a 30-in. lathe with 6-in. belt is none too much for the continuous strain of pulling a heavy cut on projectile steel.

The design of expanding arbor should

peal to the small producer, is to centre the shell in a drill press and then chuck it by the untrimmed base in an ordinary four-jaw independent chuck, supporting the outer end in the tail-stock. After rough turning, the shell would be cut off close to the chuck. A suitable centering fixture is shown in Fig. 3. If preferred, the nose may be drilled out to approximate size and a pipe centre used afterward in the lathe.

Referring to Fig. 3, the fixture consists of a plate A, which swings around hinge-bolt B. A vertical stem or arbor B is mounted on the plate so as to pass exactly under the centre of the drill spindle, and when in this position is located by taper pin C. A drill bushing I is conveniently supported from the column of the machine. The upper end of the arbor is provided with a three-cornered flange E, which centres the forging from the inside, while a similar method is adopted at the lower end where a tapered plug,

F, with or without three-point contact, rests on a spring of suitable strength, so that the base of the shell is also centred from the inside with a fair degree of accuracy. Set-screws, as shown, hold the shell firmly while being drilled.

The shell is now transferred to the engine lathe where an arbor of similar type is employed. The point of the arbor projects right up to the end of the nose where it has three-point contact on a circle slightly larger than the hole.

The back end of the arbor has a spring controlled taper plug for centering from the inside. With the tailstock centre pressing the forging against the point of the arbor, and the open end centred by the spring plug, the chuck jaws are tightened up carefully around the base, when operations proceed as before. When this method of driving is adopted, it may be found preferable to face the nose down to thickness by means of a short cutter-bar used in the tail-stock and having a pilot to neutralize the long overhang of the shell from the chuck.

Assuming that up to this point a satisfactory sequence of operations has been decided on, the shell is now ready for rough turning.

Chief interest in this operation centres around the method of forming the profile. The radius link method is simple to construct and operate, but calls for close duplication in placing the forgings, and considerable accuracy in locating the point at which it is disengaged and a parallel cut started. A plan view, Fig. 4, shows the principal features of this method.

Secured to the cross-slide A is the stud B. Upon this stud is placed one end of the link C, the opposite end of which is placed over the stud E, which is held in the bracket D. This bracket is firmly bolted to the bed of the lathe, the stud E protruding above the level of the saddle.

The tool rest, and cross-slide as well as the stud B will travel as a unit; therefore the path of the cutting point of the tool will be an arc of a circle, whose radius will equal the length of the link C. Care should be taken to have the

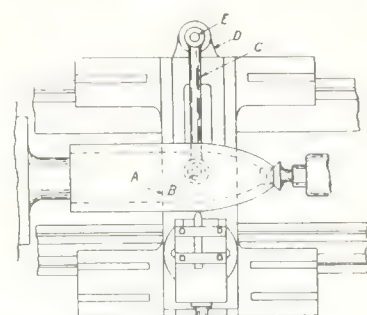


FIG. 4. METHOD OF USING LINK FOR FORMING PROFILE ON SHELL

cutting tool in the proper position when the link C is at right angle to the axis of the shell or lathe spindle.

The length of the link, between centres, for the 8-in. shells would be 15.9 inches, and for the 9.2-in. shell would be 18.4 inches. The desired size is obtained by the use of the compound rest. It might be well to state that no matter in what position the tool is, the radius of the contour will always be the same when the same link is used.

The method of forming the profile

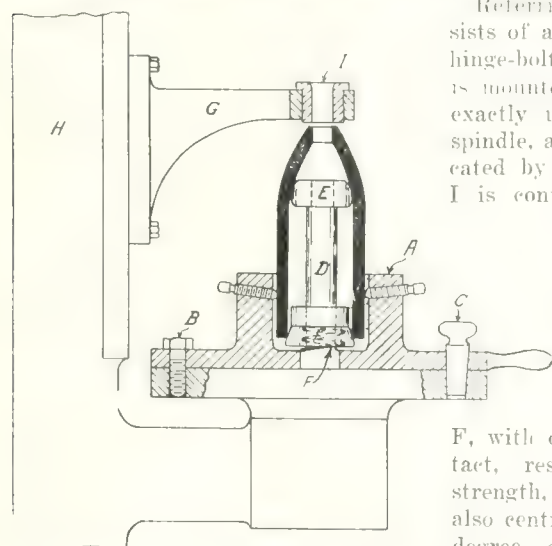


FIG. 3. FIXTURE FOR CENTERING AND DRILLING SHELL FORGINGS IN DRILL PRESS

be such that all possible strength is obtained at the root of the stem where it spreads out into the driving flange. Numerous types of expanding mechanism have been devised for arbors handling

from a copy bar either at back or front of the carriage has attained a fair degree of popularity and will doubtless be adopted by several makers. Once it is adjusted for position, it requires little attention to operate.

The necessity for accuracy in machining the thickness of the nose now becomes apparent. While the outside diameter of the parallel body can be easily measured by gauges, and the approximate thickness of wall readily determined, the same method cannot be used on the nose profile. Assuming, therefore, that the nose has been faced so as to leave a safe thickness of metal, the extent to which the outside can be machined can be determined from the reduced diameter of the flat end of the nose.

If, when the parallel portion is roughed to size, the diameter of the point of the nose is still large, the cutting tool must be moved to the left, but not any nearer the centre. The effect of this is to take another cut from the outside of the nose, but no more from the diameter of the body. The actual dimensions of nose thickness and diameter of the face when rough turned require, therefore, to be carefully determined at the start, after which suitable profile gauges will enable rapid production to be maintained.

The rough cut is carried down to the base till enough machined surface is obtained. Should the base have been cut off in the first place, no further work will be required under group A, but if not, the point for cutting off the base can be accurately located from the point of the nose, after which the shell is ready to proceed to the operations outlined in group B.



#### LITTLE KNOWN FACTS ABOUT GRINDING—BELTING

By H. W. Dunbar.

HOW many operators or owners of grinding machines fully realize the important part the belting plays in the actual production and quality of the work accomplished in a grinding machine? I think very few. This statement is based on observations made while passing through shops using a great many grinding machines.

##### The Finish Feature

To begin with, when one desires to finish work having a true, high-reflecting

surface, free from chatters and mottles, the belts must be absolutely true when running, and must have a uniform thickness throughout their entire length. The slightest variation in thickness either where an endless belt is joined together or where a lacing of wire, rawhide or other material is used, will immediately set up a vibration in the parts with which this belt is connected. These vibrations, if of great enough magnitude, will be transmitted to the wheel or the work, and the result will be chatters or mottles. This applies, of course, primarily to those belts in close proximity with the wheel and work, such as the belt running from the motor to the frame drum on the back of the slide, or from the drum to the wheel spindle, or from the headstock (if it be a belt driven machine) to the drum overhead. When one desires a finish of such a degree of

work are essential to the greatest efficiency of the machine. If for any reason the wheel slows up while performing work, the cutting action immediately changes and production falls off; the same is true of the work if it varies in speed. The relative speed of the wheel to the work, when the correct speed has once been selected, must be maintained constant. This affects not only the production of the parts being ground, but also the wheel wear.

From this it will be seen that it is necessary that the belts be of the proper width to transmit the power necessary to do the work. They must also be maintained at a constant, uniform tension, which will also insure a constant speed.

Care must be taken to prevent oil and grease from getting on the belts to aid in maintaining this condition. Do not

fill the spindle boxes so full of oil that they run over and drop on to the belts. Learn how much oil must be put into each place, and keep the oil level, so adjusted as not to waste the oil and bring about unsatisfactory results through its being distributed over the belts. It will be seen that poor belting will stretch in spots and not allow the belt to have a uniform friction on the surface of the driving pulley, resulting in loss of speed.

As a last word of caution, keep the belts smooth: keep them true: and always replace the original belts with others of the same grade, quality,

thickness and width. Keep them free from oil and foreign substances.—Grits and Grinds.



#### MAIL TO SOLDIERS

IN order to facilitate the handling of mail at the front and to insure prompt delivery it is requested that all mail be addressed as follows:—

- (a) Regimental number.
- (b) Rank.
- (c) Name.
- (d) Squadron, Battery, or Company.
- (e) Battalion, Regiment (or other unit), Staff appointment or department.
- (f) Canadian contingent.
- (g) British Expeditionary Force.
- (h) Army Post Office, London, Eng.

Unnecessary mention of higher formations, such as brigades and divisions, causes delay.



GROUP OF SHELL FORGINGS

perfection, the belts must be as smooth in their running as it is possible or practicable to make them.

The trouble generally comes when the original belts, which have not only to be true for thickness but run true as well, have been worn out and have to be replaced. It is then that great care must be taken to see that a good quality belt, perfectly true, be selected to replace the old one. To maintain this condition indefinitely throughout the life of the belt it becomes necessary to select the very best grade and quality of belting for a grinding machine. Never replace an endless belt with one carrying a wire lacing or any other form of lacing which will give a "bump" as it passes over the pulley; if you do you cannot get smooth work. So much for finishing.

##### The Production Feature

On the question of production, it is well known to the designers of grinding machines that uniform speed of the wheel and uniform revolution of the



# Sheet Metal Elbows: Their Development and Laying Off-IV

By J. W. Ross

*In order to thoroughly understand the principles involved in the development of cylindrical and other forms, such as are met in sheet metal work, a considerable knowledge of geometry is desirable. Through the medium of these articles, the author places practical examples at the disposal of our readers, and the knowledge to be gained by a close and persistent study of the principles and methods employed will well repay the time spent.*

## 180-DEGREE ELBOW

**F**IG. 18 shows the elevation and cross-section of a 7-piece U-shaped elbow of 180 degrees plated with inner and outer courses.

Mark off the inside diameter, CD,  $23\frac{1}{2}$  inches, and the outside  $24\frac{1}{2}$  inches, thus making the neutral diameter 24 inches. Measure off D to O equal to 21 inches. With O as centre and the inside dia-

diameter 7 1, which is  $24 \times 3.14$  equals 75.36, or nearly  $75\frac{3}{8}$  inches. Measure off this distance along the line FCDF, Fig. 19. Divide this into twice the number of equal parts as in 7 4 1, Fig. 18. Raise perpendiculars from these points and number accordingly. Transfer all the distances from course R in a similar manner as explained in previous problems. Fig. 19 shows the whole pattern

shown, and then calculate the stretchout. The inner course is  $75\frac{3}{8}$  ins.; an easy fit is desired for the outer course, therefore to this measurement add on  $6\frac{1}{2}$  times the plate thickness. The stretchout for the outer course will equal  $75\frac{3}{8} + (6\frac{1}{2} \times \frac{1}{8}) = 78\frac{1}{8}$  inches. Measure this distance off along the line  $4^3 4^3$ , Fig. 20. Divide into twice the number of equal parts as are used in the half

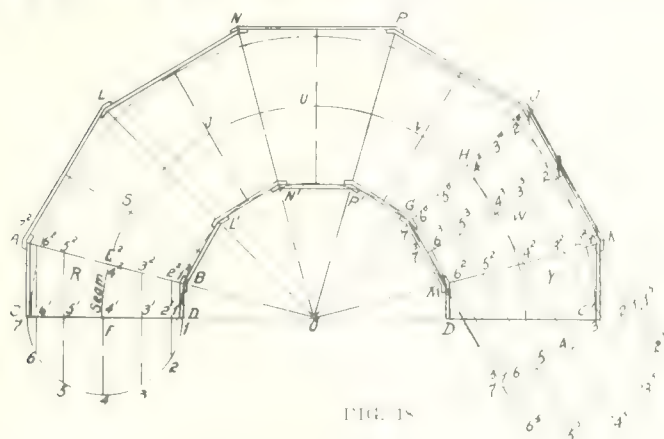


FIG. 18



FIG. 19

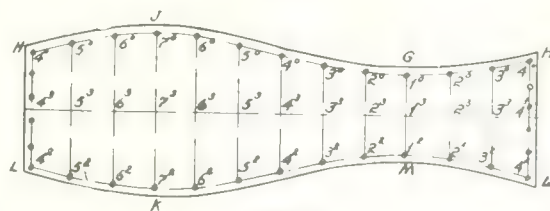


FIG. 20

meter at C as radius, strike the arc  $CC^1$ . Again with O as centre and the inside diameter at D as radius strike the semicircle  $DD^1$ . Divide the semicircle  $CC^1$  into 12 equal parts. As the elbow is made up of seven courses, each part will then be equal to  $180 \text{ degrees} \div 12$  equal to 15 degrees. At the points located draw in the radial lines as AO, LO, NO, PO, JO, KO. Draw in plate thickness from C and D to the mitre line AB, and at right angles to the line CDO. Draw in the thicknesses LN and  $L^1N^1$  of the course J with the inside diameter tangent to the two semicircles  $CC^1$ ,  $DD^1$ , respectively. This may also be done by using O as centre and the thicknesses A and B as radii (course R), marking these distances off on the radial lines from O as centre, and locating the thicknesses at LNPJK, also  $L^1N^1P^1G^1M^1$ . Connect these points by lines representing the plate thickness for the inner courses, also draw in the outer courses as shown in Fig. 18.

With centre  $4^1$  and the neutral point 7 as radius, draw in the half section plan view 7 4 1. Divide this into a number of equal parts. From these points draw in the construction lines—through and at right angles to CD—to the mitre line AB. Number as specified.

Calculate the stretchout of the neutral

for R and Y courses, and the half pattern for courses J and V.

The courses S, U, and W are outside courses and require to be developed as such. For sake of clearness the centre girth line  $7^3 1^3$  of course W is projected to  $7^5 1^5$ . Centre line HL is extended to  $4^3 4^5$ ; with 4 as centre and the neutral radius of course W, which is  $4^5 7^5$ , draw in the neutral half-section plan view of course W, as  $7^4 1^4$ .

Divide this semi-circle into an equal number of parts. From these points draw lines

section view 7 4 1, Fig. 18. Draw perpendiculars through these points. Name

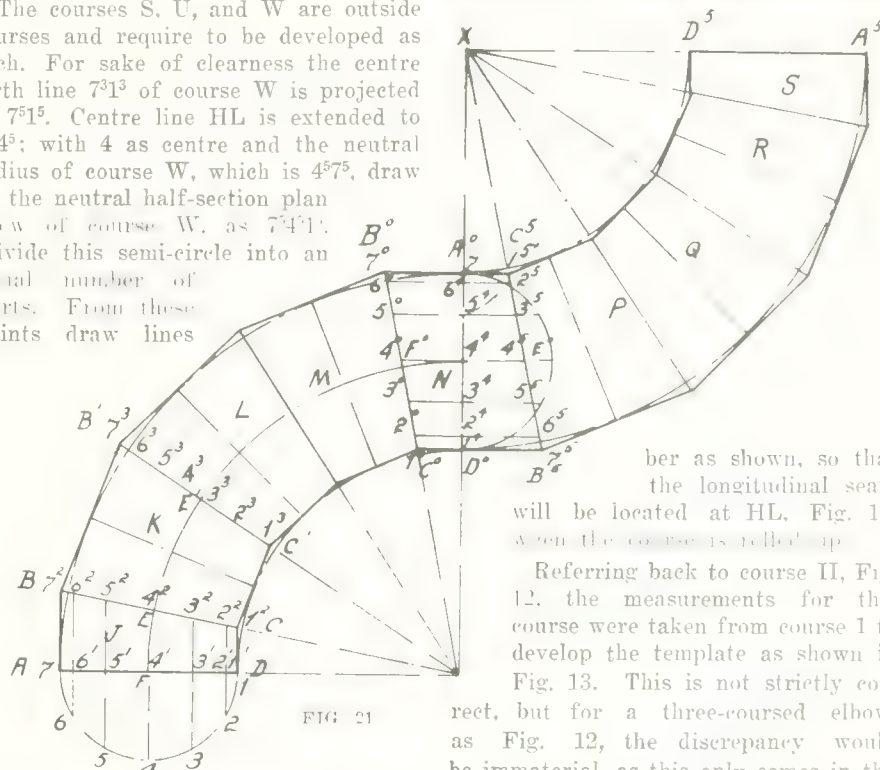


FIG. 21

ber as shown, so that the longitudinal seam will be located at HL, Fig. 18, when the course is rolled up.

Referring back to course II, Fig. 12, the measurements for this course were taken from course I to develop the template as shown in Fig. 13. This is not strictly correct, but for a three-coursed elbow, as Fig. 12, the discrepancy would be immaterial, as this only comes in the one course. In an elbow of several courses this difference would be propor-

parallel to JK and  $HL^4 4^5$ , to their intersections on JHG. Number these lines as

template to the number of courses and the thickness of plate used.

It will be noticed in Fig. 12 that the distance BC is slightly longer than AB and that JH is shorter than JK. This appreciable difference coming in each of the three courses, S, V, W, would not be conducive to accuracy. With this defect pointed out, the template, Fig. 20, will be developed from the construction lines on course W, Fig. 18, which are drawn in for this purpose.

With dividers set to the distances  $7^{\circ}30'6^{\circ}$ , etc., Fig. 18, transfer over to  $7^{\circ}7'$ ,  $7^{\circ}7'$ ,  $6^{\circ}6'$ ,  $6^{\circ}6'$ , Fig. 20, similar to the preceding problems. Fig. 20 shows

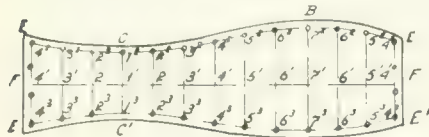


FIG. 20

the complete template with lags added and rivet holes marked in. It is again repeated that it is not necessary to draw in the full elevation view as shown in Fig. 18, unless desired. All the necessary information can be obtained by calculating the mitre line and on this drawing in the construction lines as shown by course R, and the construction lines of course W, drawn on course S. Therefore all that need be drawn will be courses R and S.

#### Double Elbow

Fig. 21 shows a double elbow of 9 courses. It is drawn out in full elevation to illustrate the method of obtaining the development of course N.

Measure off AD 18 inches, and OD 22 inches. With centre O and radii OA and OD strike the quadrants AA° and DD°. Draw A°D°O at right angles to ADO. With radius OA, mark off the point X on the extended line OD°A°X, from the point D°. With the same radius and X as centre, draw the quadrant D°A°; also

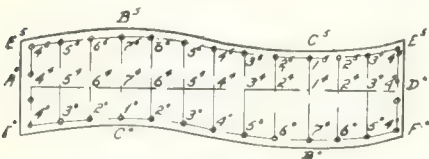


FIG. 21

with X as centre and XA° as radius draw in the quadrant A°D°. XD°A° is parallel to ADO and at right angles to XA°D°O. Divide the quadrants AA°, D°A° each into 8 equal parts and connect these points to their respective radial points O and X. Draw in the outline of the pipe similar to preceding problems. Fig. 22 shows the whole templet for courses KLMPQR, and half of this templet will be the pattern for courses J and S.

Course N will now be developed. On neutral diameter A°D° strike the half-section view A°E°D°. Divide this into the

same number of parts as course J. Draw construction lines from these points parallel to BC° and C°B°. Number as shown. The stretchout of the diameter A°D° is equal to the stretchout of the diameter AD, course J, which is  $18 \times 3.14$  equals  $56\frac{1}{2}$  inches. Measure off A°E°D°, Fig. 23, equal to  $56\frac{1}{2}$  inches and divide this line into 12 equal spaces, which is twice the number in the half sectional view A°E°D°, Fig. 21. Draw perpendiculars through these points. With the longitudinal seam on  $4^{\circ}4^{\circ}$ , Fig. 21, number accordingly on Fig. 23. With dividers set to  $4^{\circ}4^{\circ}$ , Fig. 21, transfer over to Fig. 23 as  $4^{\circ}4^{\circ}$ ; reset the dividers to  $4^{\circ}4^{\circ}$ , Fig. 21, and transfer over to  $4^{\circ}4^{\circ}$ , Fig. 23. Similarly transfer all the rest of the measurements over to Fig. 23. The complete templet is shown in Fig. 23 with rivet line in rivet centres and lap allowances drawn in.



### SAFETY IN CRANE CHAINS

By E. B. Morgan

AFTER quite an extended study of failures due to a crystallized link, the writer has concluded that they are due to imposed stresses equal to and in excess of the elastic limit, and in this brief discussion will attempt to show that the crystallized link is undoubtedly due to overloading and cannot be prevented by annealing.

The term crystallization is undoubtedly a misnomer, as all steel and iron is originally crystalline in structure. What really takes place is that the working of the metal beyond the elastic limit simply breaks down the long fibers or granulates them. It is simply a condition of fatigue. The characteristic hardening or brittleness of the metal in this condition is undoubtedly due to the heat which is set up internally by the slippage of the fibers.

#### Determining the Safe Load

The writer is firmly convinced that the proper safe load should be based upon a permissible working stress for the extreme fiber, and not on the ultimate breaking strength test of the chain. This necessitates the solution of the maximum extreme fiber stress developed in an elliptical shape which is the usual shape of a chain link, and involves a theory which has received very meager attention in technical works. There seems to have been only one attempt to develop a formula for the fiber stress developed in an elliptical ring based on experiment and good sound theory. I refer to a thesis on the strength of chain links made at University of Illinois Experimental Station in 1907, in which the following formula has been developed for open links. This formula can be readily derived by

applying the theory of flexure in curved shapes.

P

$$f = \frac{P}{0.4d^2}$$

Where  $f$  = extreme fiber stress in tension.

$d$  = diameter of the stock used in link.  
 $P$  = load on the chain.

In a recent bulletin on safe loads issued by the National Safety Council, the subjoined safe loads for straight suspension for wrought iron hand-made short link chain are recommended. The writer has found by actual experimental tests that these values are on an average of about one-seventh of the ultimate breaking strength, and are in fact a trifle lower than the loads imposed in general practice in most plants.

Size	Safe load
$\frac{1}{2}$ in . . . . .	2,400 lb.
$\frac{5}{8}$ in . . . . .	4,000 lb.
$\frac{3}{4}$ in . . . . .	5,500 lb.
$\frac{7}{8}$ in . . . . .	7,500 lb.
1 in . . . . .	9,500 lb.

With these recommended safe loads the following stresses in the extreme fiber are developed by using the formula as cited above.

$\frac{1}{2}$ in . . . . .	24,000 lb. per sq. in.
$\frac{5}{8}$ in . . . . .	25,600 lb. per sq. in.
$\frac{3}{4}$ in . . . . .	24,500 lb. per sq. in.
$\frac{7}{8}$ in . . . . .	25,000 lb. per sq. in.
1 in . . . . .	23,700 lb. per sq. in.

This means that the extreme fiber will be stressed up to and in excess of the elastic limit in the case of an iron chain, as the writer has made repeated tensile tests on Norway or Swedish iron, which is about as pure as any commercial iron obtainable, and has never developed more than an average ultimate tensile strength of 44,000 lb. per square inch, and an average elastic limit (or drop of the beam) of 23,500 lb. per square inch.

This shows how such loading as exhibited produces stresses in excess of the elastic limit, notwithstanding the fact that the impact stresses due to mechanical braking when lowering the hoisted load, which are no doubt very severe under certain conditions, have been neglected. It is evident this magnifies the danger in applying stresses which will destroy the resiliency of the metal. This is, without a doubt, the reason why chain links become brittle and fail. It is also the reason why the average user encountering such difficulties resorts to annealing as a remedy.

#### The Annealing Question

There has been much said of late both pro and con concerning the annealing of chains for restoring the metal from the so-called crystallized condition to the original physical properties. No doubt this annealing is a good thing in that it often forestalls failure, not because the



metal has been completely restored to its original qualities, but because it has simply been made tougher. The writer has made several experiments on sections of metal taken from crystallized links, trying to find out what or annealing really does completely restore the metal. A series of four tests was made in each of the following cases:

A test bar was prepared from a piece of original stock of Norway iron, which was used in making up several chains. These chains were put in service and subjected to loading in accordance with the tables recommended in handbooks, and after a short time became fatigued and failed. Two test bars were prepared from each side of the failed link, one bar being left in the fatigued condition and the other annealed to a temperature of 1,500 deg. F. These specimens were tested in a tensile machine with the following results. The figures exhibited are an average of four tests in each case.

Specimen	Elastic Limit (Drop of Beam)	Ultimate Tensile Strength	Per Cent. Elongation	Reduction of Area	Fracture Cup
Original stock . . . .	25,600	41,500	48.5	78.4	Cup
Fatigued, not annealed . . . . .	38,700	46,900	29.0	74.6	Irregular
Fatigued, annealed . .	30,000	44,300	47.0	78.3	Cup

The chemical analysis of the original stock showed carbon, trace; phosphorus, 0.029 per cent.; sulphur, 0.006 per cent.; manganese, trace; silicon, trace.

A careful examination of the above test data will show that the annealing did not completely restore the original physical qualities of the iron. The writer does not feel that annealing is inadvisable, but is firmly convinced that annealing is not the cure for fatigue. Annealing chains is certainly a good additional safety factor in that it softens the metal and does away with the dangers of a brittle link, but the fact still remains that an annealed chain will undoubtedly fatigue if overloaded, so we are not going to have maximum safety in chain practice by all the proper annealing.

What must be done is to revise the present code of so-called safe loads and base them on the rational basis of the permissible extreme fiber stress of the material used. It is going to be hard to remedy this overloading of chains, as a big misunderstanding has taken deep hold of the average mechanic and user of chains. To convince an old shop hand that a 5/8-in. iron chain should be only worked to 1,600 lb. in straight tension when he has been using it to about 5,000 lb. is indeed a hard proposition, as he feels it is perfectly safe because the chain has carried the load numerous times without failure.

#### Recommendations

In summarizing the writer feels that the following points should be closely

observed to procure maximum safe conditions in crane chain practice:

1.—Decide upon material desired, low-carbon open-hearth steel or an iron as nearly free from impurities as possible. A pure iron, I believe, is preferable to steel as it makes a better weld than steel, and also an iron link will stretch out to a lock more easily if overloaded, which serves as a telltale for inspection.

2.—Prepare a rigid set of specifications covering the material, workmanship, and tests desired.

3.—Insist on a hand-made link, as the machine made link is bent cold around less than twice its own diameter at a high speed on an elliptical mandrel. This sets up severe initial internal stresses in tension and compression in the outer and inner fiber of the link respectively. The hand-made link is made under a cherry red heat and obviates such stresses; also a far better lap weld is secured in a hand-made link.

4.—Number each chain and keep a record of when it goes into service and length of service and class of work it is used for. Inspection should be made daily by a competent and experienced person to detect any reduction of section due to wear, deformation of links and any visible flaws developed in the welds. This is somewhat tedious and expensive, but must be done and done carefully to insure safe operation. A fatigued link has a characteristic metallic ring when struck a sharp blow with a hammer, while a good piece of Norway iron has a decided dull sound when so struck. The writer has found that rings so detected by a metallic ring can be further tested by placing the link edge-wise on an anvil and striking it several sharp blows with a sledge. If it is fatigued it will break with a decided crystalline fracture.

5.—Special attention should be given to the design of the ring that connects the chain to the block hook. This ring should be designed to withstand the same load as the chain, using the regular formula for a circular ring under tension in a diametral line.

6. It is advisable to check up the size of the hook as the writer has found the usual practice of designing a hook is to use the following empirical formula:

$$f = \frac{P}{A} + \frac{P_h}{S}$$

Where S = area of critical section S S

This formula is in error in that the second term represents the bending stress calculated from the formula used for straight beams, which, however, does not apply to curved pieces, and the formula given above is not even approximately correct. The correct stress caused by the bending moment can be solved by consulting any standard work on strength of material. The writer has also found many operations where it is necessary to suspend the load on the point of the hook. If there is any possibility of such practice, the hook should be designed accordingly, otherwise the stresses produced will be dangerous.

7.—The last but most important recommendation is:—To subject the chains to a proper load and as an additional safety precaution, anneal them before they are put in service. This annealing though will not prevent fatigue of the metal in case the chains are overloaded, but will merely soften the chains so they will pull to a lock and serve as a telltale for overloading.

It is obvious from the foregoing discussion on the causes of fatigue that annealing at regular intervals is entirely unnecessary, as, if there is any benefit from annealing at all, it will be merely to toughen the metal, and therefore is only necessary once.

From a paper before the National Safety Council Congress at Philadelphia, by E. B. Morgan, safety engineer, Commonwealth Steel Co., St. Louis.



#### NOVA SCOTIA STEEL CO.

AT a meeting of the directors of the Nova Scotia Steel & Coal Co. at Halifax, N.S., on Nov. 11, the general manager reported that in October the shipments exceeded those of September by 30 per cent., and that unfilled orders on November 1 and material since actually booked would call for 180,000 tons of steel. This is quite apart from the car-building material requirements which are likely to be large. Estimates for the construction of a new open hearth and steel-melting furnace of the largest type were submitted. The management were directed to proceed with construction at once. The new furnace will be ready to produce two hundred tons of steel per day within twelve weeks. Foundation work for the new forging plant is now well advanced.

R. E. Chambers, superintendent of mines, was instructed to resume the underground mining of ore at Wabana immediately, and to continue work throughout the winter at maximum capacity. The export of forged shell blanks is increasing weekly, and further new business for foreign account has been offered the company during the present week. The Eastern Car Company despatched three steamers with cars this week.

# PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

## NEW SHELL BORING LATHE

**B** EING a matter of vital importance that the output of machine tools for the production of shells should be increased to the maximum, Alfred Herbert, Ltd., Coventry, England, have put in hand large batches of a simple design of turret lathe for shell boring, from which all unnecessary work has been eliminated, and which it is, therefore, possible to build very rapidly. The No. 5 Shell Boring Lathe, as it is called, embodies, nevertheless, a number of valuable features, all of which tend towards high production; the line drawing, Fig. 1, gives a good idea of its general appearance.

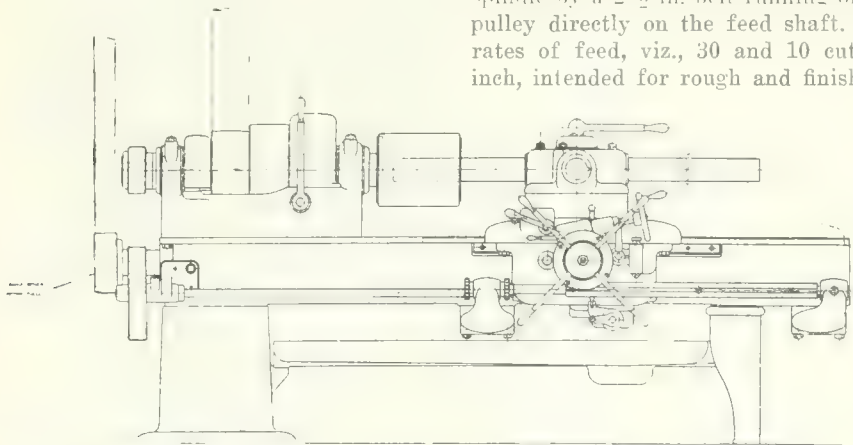


FIG. 1. OUTLINE DRAWING OF NO. 5 SHELL BORING LATHE.

The machine has been designed chiefly for performing the boring and bottoming operations on high explosive shells from 4.5 in. to 6 in. inclusive, but with a suitable tool arrangement it can be used for a number of other operations, such as boring the chamber for the base plug, and forming and facing the closed end of high explosive shells, and also for boring shrapnel shells.

The headstock, which has a height of centres of 10 in., has a large spindle with a 10-in. flange. It has a two-step cone for 5½-in. belt and back gearing of a high ratio. The cone pulley does not drive the spindle direct, but only through the gearing, the spindle being started and stopped by a friction clutch in the main gear, operated by the lever in front of the headstock.

The cone pulley is intended to be driven from a cone formed by putting two split pulleys together on the line-shaft. When used on shell work the lathe is run continually on one spindle speed. The second step of the cone

makes it possible to obtain an additional speed by shifting the belt. This is an advantage if an occasional hard forging is met with, and it becomes necessary to slow down the speed.

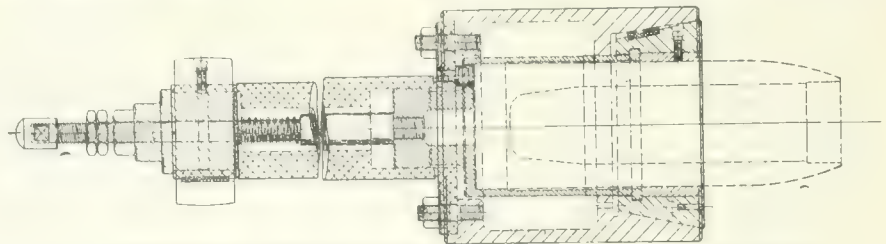


FIG. 2. DRAW-BACK CHUCK FITTED TO NO. 5 SHELL BORING LATHE

The feed motion is driven from the spindle by a 2½ in. belt running on to a pulley directly on the feed shaft. Two rates of feed, viz., 30 and 10 cuts per inch, intended for rough and finish bor-

ing great service, particularly where female labor is employed. Automatic and dead stops are provided for each hole in the turret, the rotating stop rod being in front of the bed. It has the patent

“unison” motion, which allows all the stops to be moved endwise to accommodate variations in the forgings. In addition to the pilot wheel there is a powerful hand feed to the turret by worm gearing for finishing the bottom of the shell bore. An oil pump and piping are included, giving an internal supply to the tools.

A plain reversing countershaft can be furnished as an extra when boring and tapping of shell noses after “bottling” is to be done. As closed-in shells are now being replaced by the “block filled” type with screwed in noses, this extra will hardly ever be required.

### The Chuck Feature

The chuck being supplied in conjunction with this machine is shown in the line drawing, Fig. 2, and is of the draw-back type. This chuck was designed with a view to making it suitable for employment with female labor.

ing respectively, are obtained by a gear change in the apron.

The turret has four tool holes 3¼ in. diameter, which are provided with keyways. It is rotated by hand and clamped to its seat after indexing by a powerful

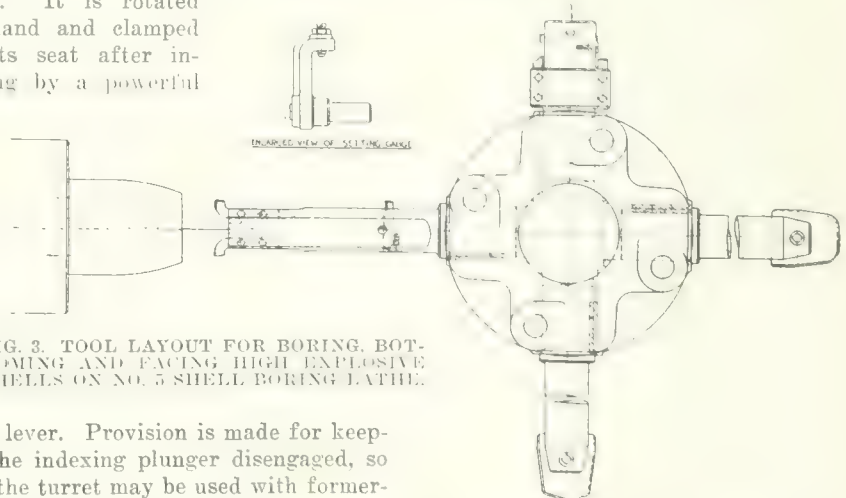


FIG. 3. TOOL LAYOUT FOR BORING, BOTTOMING AND FACING HIGH EXPLOSIVE SHELLS ON NO. 5 SHELL BORING LATHE.

hand lever. Provision is made for keeping the indexing plunger disengaged, so that the turret may be used with former-controlled bars, if required.

The turret slide has quick power transverse motion along the bed, which is of

Referring to the line drawing, it will be seen that the body of the chuck is an



iron casting bolted on to the spindle flange, the front end being bored taper to receive the split collet; this is furnished with steel liners, which can be renewed when worn. The collet is pulled back by a steel sleeve which has a collar on the front end fitting in an annular groove in the collet. The back end of this sleeve is bored to fit the closed end of the shell which butts back against a fixed stop screwed into the spindle flange. The location is, therefore, unaffected by variations in the diameter of the shell.

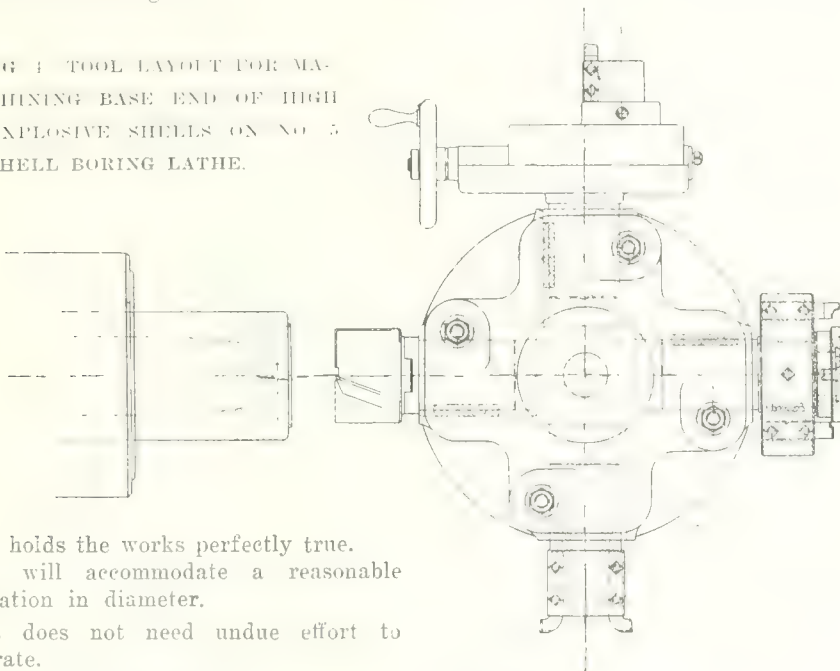
The draw-back rod itself is operated by a hexagon nut at the back end of the spindle, an ordinary spanner being employed for tightening the chuck. The following advantages are claimed for the chuck:-

It holds the work securely under the heaviest bottoming cuts.

The next tool is a spade drill, which takes up the boring at the point left by the previous bar, and its purpose is to remove the scale from the bottom of the hole. The cutter is approximately to form, but is much easier to feed into the bottom than an ordinary spade tool, owing to the drill point, which cuts through the scale without losing its edge quickly. As it is only a roughing tool, regrinding is quickly done, for the shape is not important, and need not be exactly to form.

The third tool is a spade cutter, correct for diameter and form, which finishes the bore like a reamer, at a feed of 10 cuts per inch, and also trues up the form at the bottom of the shell, the hand worm feed being used for this part of the work, after the automatic feed has tripped. As this cutter has very little to remove, and does not cut on the

FIG. 4. TOOL LAYOUT FOR MACHINING BASE END OF HIGH EXPLOSIVE SHELLS ON NO. 5 SHELL BORING LATHE.



It holds the works perfectly true.

It will accommodate a reasonable variation in diameter.

It does not need undue effort to operate.

It is quick to operate.

It has no projecting parts.

It holds the work without distortion.

#### Tool Layout

The tool layout for boring, bottoming and facing the latest type of high explosive shells is shown in Fig. 3. Four turret tools are employed, and the first bar which rough bores the parallel portion, has two forged cutters carried in slots at the end, while a round cutter some distance behind takes the first cut in the thread diameter. This type of boring bar is a great producer, and is infinitely superior to a spade tool for parallel boring, as it can be ground with top rake, making it very free cutting, a feed of 30 cuts per inch being used.

For quickly setting the two cutters equidistant from the centre and to the correct size, a setting gauge is provided which fits in a hole at the end of the bar. This is shown in the layout.

scale, its life is long, and it seldom needs regrinding.

The last turret bar bores the thread diameter to size, faces the end, and chamfers the mouth. All bars except the last are provided with internal oil supply.

For boring the recess for the base plug, and facing the end, four tools are again used, the layout being shown in Fig. 4. The first is a four-flute reamer cut to centre, which feeds straight into the end of the shell, and roughs out the recess. This is followed by a head carrying two single point cutters for boring to size.

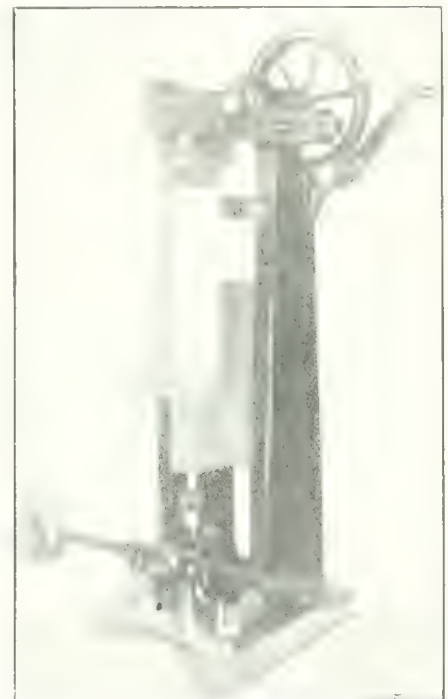
On the next turret face is a head which pilots with a revolving bush into the recess, while two cutters respectively face the end and form the radius.

The facing of the bottom of the recess is done by a traversing single point cutter in the slide facing tool on the last turret face, completing the operations.

## MARKING MACHINES FOR HIGH EXPLOSIVE SHELLS

THE photograph herewith illustrates a special machine for marking the base of shells up to 6 in. in diameter and  $21\frac{1}{2}$  in. in length. These machines are made in two sizes: Special No. 3A for marking the base of shells up to 12 in., and Special No. 3B for marking the base of shells from 12 in. to  $21\frac{1}{2}$  in. in length. The principle involved is the same as the makers Standard Dwight Slate marking machines.

The roll die passes over the base of the shell, and the foot lever raises the table to any desired depth of die so as to give an accurate impression. The No. 3A is arranged with a hand lever, by one pull of which the die revolves and completes the mark. On the No.



MARKING MACHINE FOR HIGH EXPLOSIVE SHELLS

3B, in order to get the desired pressure on the larger shells, an arrangement of gears increases the power without increasing the strain on the operator. Shells, it is claimed, can be marked with these machines on the base practically as fast as they can be lifted in and out, as the operation of marking requires only from five to ten seconds. Dies are furnished with these machines to order.

The Noble & Westbrook Mfg. Co., Hartford, Conn., are the manufacturers of the foregoing products.



## SHELL GROOVING, WAVING AND UNDERCUTTING MACHINE

THE machine shown in the accompanying illustration has been specially designed for cutting, dovetailing and

waving the driving band groove in 4.5 in. and 60-pdr. (5 in.) shells.

The working mechanism is mounted on a short heavy bed cast with an oil pan and mounted on standard legs. Two heavy separate bearings are firmly bolted to the bed; front bearing being 9 $\frac{3}{4}$  in. diameter x 7 in. long; rear, 5 $\frac{1}{2}$  in. x 6 in. The bearings are filled with best babbitt, peened in and bored, and finally scraped to fit the spindle. Means of adjustment are provided. The spindle is steel with bearings, etc., finished by grinding on dead centres. The nose or chuck end is fitted with a powerful collet chuck, operated by an air cylinder at the rear end of the spindle.

The drive is through cut gearing from a shaft at the rear, on which is mounted a friction clutch pulley, also operated by air. Two valves are provided so that the chuck or the drive can be operated independently or together.

The feed is through a worm and gear, which in turn connect to cam rods for operating each tool. A knock-out is pro-

vided which stops the feed when the proper depth of cut is reached. The cams are drawn back to the starting position by a hand wheel. Independent adjustment is provided for each of the three tools, so that when once adjusted the rear tools reach the finished diameter slightly ahead of the front wave tool. The wave tool is formed to give the correct wave, and is 5 in. long. It is held by clamping into a dovetail by two heavy bolts and sharpened by grinding on end. It is adjusted to the proper height by a set screw below the end of the tool, which prevents any chance of tool moving or slipping out of position.

The wave is generated by rocking the

tool to follow the wave instead of the usual plan of moving sideways. The movement is positive, as it is controlled by gearing through an eccentric. The two rear or undercutting tools are very rugged and long-lived, as standard cutting-off tool blades are used, each one  $\frac{3}{16}$  in. thick by  $1\frac{1}{8}$  in. wide. They are clamped into slide blocks set at the correct angle and width for the band groove. All the tools can be taken out, ground and replaced with only one measurement to check—that is, the diameter. This can be corrected with the machine in motion by the adjusting screw which bears on the cam block. The adjustment should be done with the feed out and the point of adjusting screw bearing on the crest of the cam.

A gear pump is provided, which runs continuously, as it is belted from the driving pulley. Oil or compound is drawn from a reservoir formed in the leg under the bearings. A relief valve is provided to protect pump when in operation.

To operate, place the shell in the shell chuck,

and one operator could easily care for two machines.

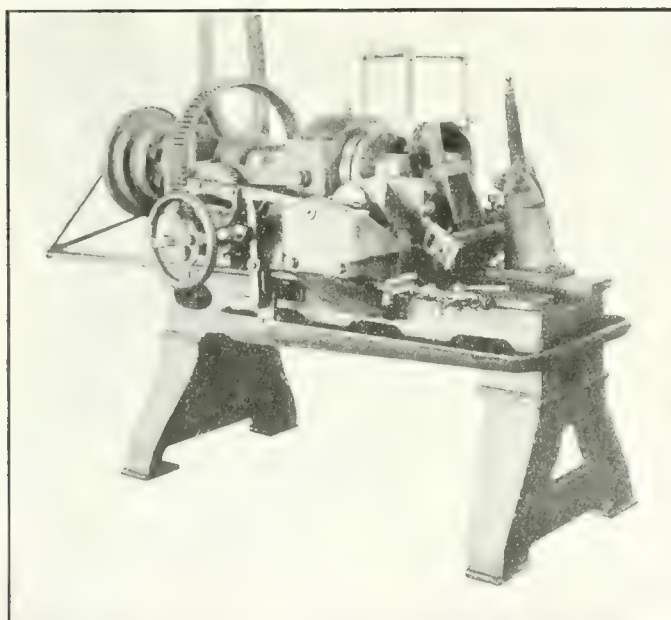
For the 4.5 high explosive shells the pulley shaft should run about 200 r.p.m., at which speed the actual cutting time is 3 minutes 10 seconds. For the 5-in. 60-pdr. shell the pulley shaft should run about 180 r.p.m., the cutting time being 4 minutes 35 seconds. Shells can be taken out and another one chucked in about 30 seconds.

This machine is a recent product of the Jenckes Machine Co., Sherbrooke, Que.

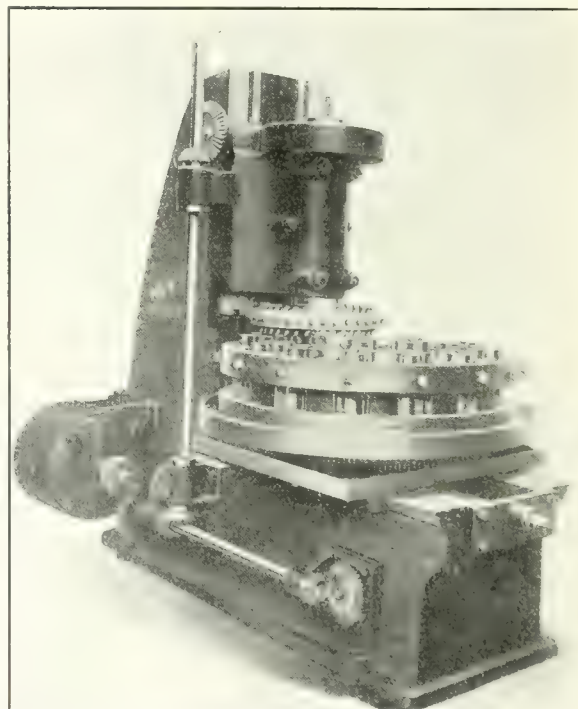


### VERTICAL MILLING MACHINE WITH UNINTERRUPTED FEED

THIS description refers to a vertical milling machine which was built by the Newton Machine Tool Works, Philadelphia, Pa., specially for milling off the solid ends of shrapnel. While the mach-



SHELL GROOVING, WAVING AND UNDERCUTTING MACHINE



VERTICAL MILLING MACHINE

ine in itself is not a new development, the adaptation of the special chuck or fixture for holding the work makes a continuous operation. A 10 in. diameter cutter is carried, and the finished work can be removed and rough shells clamped in the fixture without stopping the feed.

The method of procedure is to hold the rough turned forgings in the fixture which has a capacity for holding sixty pieces at a time. This is subdivided into pockets, each being arranged to hold five forgings which are clamped with one screw. The work table has three changes of circular feed with hand circular rotation and hand in-and-out adjustment.

The machine is semi-automatic in na-

ture, and one operator could easily care for two machines.

The machine is semi-automatic in na-



# Papers Read at the Recent Foundrymen's Convention

*Selected from the more important subjects presented for discussion before the Annual Convention of the American Foundrymen's Association and the American Institute of Metals at Atlantic City, N.J., during September, 1915. The papers cover a wide field of foundry and allied activity, the nature of the results and the completeness of the reports making them of particular interest to all who desire to keep in touch with metallurgical progress.*

## CONCERNING "STELLITE"

By Elwood Haynes.

THE name STELLITE was coined from the Latin word "Stella," a star. This name was first applied to a binary alloy consisting of cobalt and chromium, which the writer discovered and produced as early as 1899. It was not until some years later that its properties were fully investigated, when it was found to possess the following properties:

1. A considerable amount of hardness, as alloys containing 10 per cent. or more of chromium could not be successfully filed, though the file could slowly wear away the surface of the metal.
2. Considerable toughness. Alloys containing as high as 25 per cent. chromium showing elongation of 10 per cent. or more.
3. Comparatively high tensile strength and elastic limit. A bar of forged metal showing elastic limit of 85,000 pounds and tensile strength of 110,000 pounds.
4. Fine color and lustre. The color of the alloy lies between that of steel and silver.
5. Absolute resistance to oxidation or other changes when exposed to either dry or moist atmosphere at all temperatures under a dull red heat.

In 1911 the writer succeeded in producing very hard alloys (consisting essentially of cobalt and chromium) by adding tungsten or molybdenum or both. The hard alloys thus formed could not be scratched with the file, but in turn would scratch any steel that could be produced. Some of these alloys were extremely brittle, and those used for lathe tools require very careful handling. Some of them that showed excellent cutting qualities when used for turning cast iron or steel would break very easily if subjected to any abnormal stress.

In order to determine the stress required to break a  $\frac{3}{8}$ -in. sq. tool, for example, a small clamp was made in the form of a slot precisely similar to the slot used in the tool holder.

A short piece or bar of Stellite was placed in this slot and pressure applied vertically near the end of the bar at a distance of 1 in. from the clamp. Some of the weaker bars broke at from 100 to 300 pounds pressure under this test. Gradually the strength of the bars was increased until they would readily withstand 1000 pounds, and at this time bars

are produced of turning steel, which readily withstand from 1,200 to 1,500 pounds under the same test. The very hard bars used for turning cast iron usually stand from 800 to 1,200 pounds under this test. Bars that would stand as high as 1,550 pounds have been produced, but were not found to be equal in cutting qualities to some other compositions of slightly less strength. It should be remarked at this point that the cutting qualities of any steel do not depend primarily upon its strength, but upon the suitable combination of strength, hardness, resistance to wear, etc. The strength of a tool is in reality a question of elastic limit. Steels possessing this quality to the highest degree are nickel steels, nickel chrome steels and vanadium chrome steels. For turning steel and iron, however, they are of little or no value since they lack in hardness and resistance to abrasion, particularly at high temperature.

## Maintaining the Cutting Edge

The virtue of the Stellite tool lies in its ability to maintain its cutting edge at a high rate of speed at temperatures which would immediately cause the failure of any known tools containing any notable quantity of iron. Its great hardness and resistance to abrasion at all working temperatures are likewise valuable properties.

Owing to the fact that Stellite retains its hardness even at a full red heat, it cannot be forged. This fact, however, is rather a virtue than a detriment so far as use is concerned, because if the alloy would soften sufficiently for forging when heated it would, of course, immediately lose its cutting edge at the same temperature and this would limit its usefulness to a marked degree.

## A Recent Performance

From the above fact Stellite can only be reduced to the desired form by casting it in dies in the form of bars which are afterward ground to a cutting edge. Its capabilities as a lathe tool are now universally acknowledged, though in certain cases failures have resulted, due to improper knowledge of the alloy and its peculiarities. It should be remembered that it is not a steel and therefore requires special handling, which enables the operator to utilize its valuable properties to the best advantage.

Without going into the method of handling the alloy, some results obtained

by its use may not be out of place. It was recently ascertained that a  $\frac{3}{8}$ -in. sq. x  $2\frac{1}{2}$ -in. long piece of Stellite, ground to the shape of a turning tool, cut 14,000 grooves in cast iron pistons ranging from  $3\frac{1}{2}$  in. to  $4\frac{3}{8}$  in. in diameter before it became too much worn off for further use. This work was performed in regular practice and not as a test. A still more remarkable and more recent performance has just come to light in the same factory. A Stellite tool of the same dimensions as that mentioned above, but which was ground to the round nose form and used for turning pistons, turned off more than 8,000 pounds of cast iron before becoming too short for use. Considering only the portion of the tool which was actually ground away, the tool turned off 1,000 times its weight of cast iron before becoming too short for service.

Both of the above tools were made especially for turning cast iron. Another combination is used for turning steel, which has also shown equally remarkable results. These tools are now being used extensively for turning shrapnel shells at high speed for the European war.

While long wear is an important property in a lathe tool, it is not the essential or most valuable property. The value of the tool, even at the comparatively high price of Stellite sinks into insignificance when compared with the value of the time saved. For example, in the cast iron performance mentioned above, the Stellite cost only about 1¢ per day, while it effected a net saving of from \$2 to \$3 per day. In other words, it is the value of the output which counts and not the cost of the tool.



## FOUNDRY EXHIBITION OF 1916

A. O. BACKERT, secretary American Foundrymen's Association, has issued the following statement in his capacity as secretary of a special committee of the American Foundrymen's Association and the American Institute of Metals. Details of the new arrangement for the annual exhibition of foundry equipment and supplies are given in the following letter addressed to the members of the American Foundrymen's Association:

As a result of several conferences, held recently at Cleveland and Pittsburgh, by the special committee empowered by the American Foundrymen's Association and the American Institute of Metals to select the time and place

for the 1916 foundrymen's convention, it has been decided to meet in Cleveland during the week of September 11.

At Atlantic City the executive board of the American Foundrymen's Association authorized the appointment of a committee of five to decide upon next year's meeting place, and this committee was instructed by the American Institute of Metals to serve also in its behalf. This special committee is constituted as follows: R. A. Bull, Commonwealth Steel Company, Granite City, Ill., president of the American Foundrymen's Association, chairman; Joseph T. Speer, Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, and Alfred E. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn., past presidents; J. P. Pero, Missouri Malleable Iron Company, East St. Louis, Ill., senior vice-president, and A. O. Backert, Cleveland, secretary American Foundrymen's Association.

The annual exhibition of foundry equipment and supplies, to be held concurrently with the meetings of these organizations, will be conducted under the auspices of the American Foundrymen's Association and the American Institute of Metals. This decision was reached after mature deliberation and represents the unanimous action of the members of this special committee. It also has been approved heartily by J. S. Seaman, Seaman-Sleeth Company, Pittsburgh, past president of the American Foundrymen's Association, and Jesse L. Jones, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., president of the American Institute of Metals, with whom the members of the special committee met for counsel.

Since the interests of manufacturers of foundry equipment and supplies, who make exhibits at these annual shows, and the members of the American Foundrymen's Association and the American Institute of Metals are mutual, it is the sentiment of this special committee that the exhibitors should share in the profits, to be paid in the form of rebates on the cost of their space.

The exhibition will be held in the Cleveland Coliseum, located on Thirteenth Street, in the centre of Cleveland's business district. The Coliseum is within one block of the Hotel Statler, three blocks from the Hollenden, and is only a short walking distance from the other Cleveland hotels. It contains 60,000 sq. ft. of floor space on one level and is admirably adapted for a foundry show.

Sealed proposals have been invited from corporations and individuals capable of conducting exhibits, which are to be submitted to the secretary of this special committee, A. O. Backert,

Twelfth and Chestnut Streets, Cleveland, Ohio, on or before 12 o'clock noon, Eastern time, Saturday, November 13, 1915.

This communication has been authorized by this special committee, and its secretary has been instructed to notify you of the action taken.



### RE-SHARPENING OF FILES

IN a paper entitled "Machine Shop Equipment, Methods and Processes," before the recent International Engineering Congress, E. R. Norris described the operations involved in re-sharpening files as follows:—

A sand blasting apparatus is being successfully used for file sharpening, by several large manufacturing establishments. This consists of a sheet-iron chamber provided with uptake, settling tank, slurry mixing-tank, slurry overflow pipe, air agitating pipe and slurry projector. A door gives access to the inside of the chamber. The slurry projector is inclined to the horizontal at an angle of 25 deg., and the nozzle extends slightly within the chamber. The projector consists essentially of a bronze body to which are fitted steam pipe, slurry suction-pipe and nozzle. The steam supplies sufficient water for the slurry.

The files are sharpened by being held in the slurry jet in such a manner as to expose the backs of the file teeth to the cutting action of the sand. When the file has been sharpened, it is cleaned and dried by the steam, after the slurry supply has been cut off by a foot lever.

Success in file sharpening depends on the skilful selection of the files to be sharpened, maintenance of the correct angle between files and jet while sharpening, and the selection of a suitable sand. Experience shows that a sharpened file often does as much work as a new one, and the cost of sharpening averages about one-fifth of the cost of new files. The following results have been obtained under ordinary manufacturing conditions and may be taken as representative of the economies which are effected by the efficient use of this apparatus.

No. of Files Treated	Size, In.	Total cost Sand Blasting	Reb. Paid	Price of New Files
109 ..	4	8 0 88	\$ ....	\$11.99
1245 ..	6	9 0 0		130 05
1333 ..	8	14 20		199 95
943 ..	10	15 07	56 00	169 74
1206 ..	12	28 58	96 48	211 20
831 ..	14	26 09	99 72	174 51
566 ..	16	22 64	90 56	124 52
143 ..	18	6 28	27 17	51 52



### GAS ENGINE EFFICIENCY

AT full load under the most favorable conditions, the indicated horsepower of a gas-engine is 88 per cent. of that of an ideal-engine working with a similar mixture. This holds true for all

except very weak mixtures; for which the relative efficiency is lower. For mixtures containing only a slight excess of air, the above corresponds to an absolute thermal efficiency of 27 per cent. at a compression ratio of 3.75, and 33 per cent. at a compression ratio of 5.6; for mixtures containing twice the amount of air required for complete combustion the absolute efficiencies are 29 per cent. and 36 per cent. The indicated efficiency relative to the gas-standard falls from 88 per cent. to 84 per cent. between full and no load.

At full load, the brake efficiency relative to the gas-standard varies from 70 per cent. at the compression ratio 3.75, to 67.5 per cent. at the compression ratio 5.6; this holds true for all except the weakest mixtures, for which the relative efficiency is lower. The absolute brake efficiency is 21 per cent. at compression ratio 3.75, and 25.5 per cent. at compression ratio 5.6 for mixtures containing little excess of air, and 23 per cent. and 27 per cent. respectively for mixtures containing twice the amount of air required for complete combustion. The maximum brake efficiency obtained in the author's experiments was 27.4 per cent., and this occurred at the highest compression ratio for a mixture slightly stronger.

At light loads, the brake efficiency relative to the gas-standard decreases more rapidly as the compression ratio rises. For the higher compression ratios the increase of theoretical efficiency is just counterbalanced by the increase in frictional loss, and thus the absolute efficiency remains constant.

The mechanical losses increase slightly in absolute amount with the load and with the compression ratio. For the engine under test (a 25 h.p. National gas engine) at normal speed (200 revs. per min.) the mechanical losses amounted to 5.6 h.p. at no load and 6.3 h.p. at full load when the compression ratio was 3.75; and 6.5 h.p. at no load and 7.0 h.p. at full load when the compression ratio was 5.6. The pumping losses were an important part of the total mechanical losses; at a compression ratio of 4.85 they represented 2.3 h.p. at no load and 2.1 h.p. at full load, or 38 and 31 per cent. of mechanical losses.

The loss of power due to thermal losses at full load under most favourable conditions amounted to 12 per cent. of the total available energy, and at no load to 16 per cent.; of this less than one quarter was due to heat transmission during the expansion.

From a paper read at the recent British Association meeting.



# The MacLean Publishing Company LIMITED

(ESTABLISHED 1888)

JOHN BAYNE MACLEAN - - - - - President  
H. T. HUNTER - - - - - General Manager  
H. V. TYRRELL - - - - - Asst. General Manager  
PUBLISHERS OF

## CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

PETER BAIN, M.E., Editor.

Associate Editors,

A. G. WEBSTER, J. M. WILSON, J. H. RODGERS.

B. G. NEWTON - - - - - Advertising Manager

OFFICES:

### CANADA—

Montreal—Rooms 701-702 Eastern Townships Bank Building.  
Telephone Main 1255  
Toronto—143-153 University Ave. Telephone Main 7324.

### UNITED STATES—

New York—R. B. Huestis, 115 Broadway. Phone 8971 Rector.  
Chicago—A. H. Byrne, Room 607, 140 South Dearborn St.  
Telephone Randolph 3234.

Boston—C. L. Morton, Room 733, Old South Bldg.  
Telephone Main 1024.

### GREAT BRITAIN—

London—The MacLean Company of Great Britain, Limited,  
88 Fleet Street, E.C. E. J. Dodd, Director. Telephone Central  
12960. Address: Atabek, London, England.

### SUBSCRIPTION RATES:

Canada, \$2.00; United States, \$2.50; Great Britain, Australia and other Colonies, 8s. 6d. per year; other countries, \$3.00. Advertising rates on request.

Subscribers who are not receiving their paper regularly will confer a favor by letting us know. We should be notified at once of any change in address, giving both old and new.

Vol. XIV. NOVEMBER 25, 1915 No. 22

### PRINCIPAL CONTENTS.

From Ironfounding to 4.5 in. Howitzer Shell Production	489-491
Large Shells: Production Problems and Possibilities—II	492-494
Little Known Facts About Grinding-Belting	494
Sheet Metal Elbows: Their Development and Laying-out	495-496
—IV.	496-497
Safety in Crane Chains	496-497
Progress in New Equipment	498-500
New Shell Boring Lathe, Marking Machine for High Explosive Shells, Shell Grooving, Waving and Undercutting Machine, Vertical Milling Machine With Uninterrupted Feed.	
Papers Read at the Recent Foundrymen's Convention Concerning "Stellite."	501
General	501-502
Foundry Exhibition of 1916 Gas Engine Efficiency ... Resharpening Files.	
Editorial	503
Is a Steel Famine Really Imminent?	
Selected Market Quotations	504-505
The General Market Conditions and Tendencies	506
Industrial and Construction News (Advtg. Section)	62

### IS A STEEL FAMINE REALLY IMMINENT?

IF the unexpected always happens, it might reasonably be argued that the expected never happens. Present reports and future prospects, however, would seem to justify many of the assertions which are being made regarding the inability of steel makers to meet the present demand, although, whether the demand is liable to increase still further, is at the moment largely conjecture.

As the largest producer of steel in the world, the United States is enjoying a period of unprecedented activity. That this activity is directly due to the war there can be no doubt, for while many observers credit the scarcity of steel to a greatly increased home consumption, it is obvious that much, if not nearly all of this domestic activity in the States developed after the placing of war contracts by the belligerents.

Reports as to the actual rate at which munition and

other contracts calling for steel are being filled are not available for obvious reasons, but, if judged by the experience of manufacturers in this country, production should be well on to the maximum. It is true that an increase in Canadian consumption may result from the recently placed contracts for large shells, but that such an increase will result in a state of affairs approaching a steel famine seems hardly probable.

The uncertainty regarding developments in the war during the next few months is sufficient to prevent accurate forecasting of the industrial situation. The success which has attended the organization of national arsenals and controlled munitions plants in Great Britain is reducing the tendency to distribute shell orders broadcast as has been done recently. Consequently, when the present high peak of production has been passed, the consumption on this account may be expected to decrease.

The recent arrival on this side of the ocean of French Government officials regarding the assistance which could be rendered by American firms in the ultimate period of construction points to a possible continuance of consumption which, under the circumstances, might be of extended duration rather than of excessive urgency. The fact that British steel makers are extending their plants with all possible haste should not be lost sight of in its bearing on the steel market in this country.

While many furnace companies are endeavoring to place further orders for ore, indicating the probability of a shortage on docks during the winter, British firms are able to procure a steady supply of ore from Spain with which to increase their output. The close contact of Belgian, French and British officials and manufacturers discounts the probability of reconstruction opportunities being overlooked or suffering from lack of preparation by European manufacturers. The recovery of the Minette ore mines and the Alsace deposits by France will stimulate manufacturing in many ways, but as by that time, the demand for munitions may have decreased somewhat, the present highly organized industry of France may well be expected to resume production promptly and largely.

The nature of financial relations between Europe and America may not be without a retarding effect on the future steel trade between the two continents. The necessity for observing every available financial and industrial economy is becoming more apparent every day, and even later, when the tide of events is undeniably set towards Allied triumph, the necessity for economy will not be any less urgent.

Under these circumstances, and in the absence of further immediate increases in domestic consumption, the supply of steel may not fall so far short of the demand as to assume the nature of an absolute famine.

The commercial activity throughout the country which results from and reacts upon the steel industry in times like the present creates demands which do not partake of the urgency of war orders. Additions to rolling stock, building operations, county and municipal improvements, and many other undertakings of a similar kind are limited in their rate of progress by the cost of construction. The dull times in Canada and the United States which preceded the war, prevented the placing of much business, which, had it been gone on with, would have caused the present situation to be much more acute.

The highest bidder does not always get the material, and just as some firms across the line have an eye to their own permanent customers, to the refusal of export business, so will Allied interests encourage the formation of connections which, while of more than urgent necessity at the present moment, will later assume an economic value out of all proportion to their present cost.

# SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

## PIG IRON.

Grey forge, Pittsburgh .....	\$15 95
Lake Superior, charcoal, Chicago .....	17 25
Ferro nickel pig iron (Soo) .....	25 00

	Montreal.	Toronto.
Middlesboro, No. 3 ....	\$24 00	.....
Carron, special .....	25 00	.....
Carron, soft .....	25 00	.....
Cleveland, No. 3 .....	24 00	.....
Clarence, No. 3 .....	24 50	.....
Glangarnock .....	28 00	.....
Summerlee, No. 1 .....	30 00	.....
Summerlee, No. 3 .....	29 00	.....
Miehigan charcoal iron. ....	28 00	.....
Victoria, No. 1 .....	24 00	21 75
Victoria, No. 2X .....	23 00	21 75
Victoria, No. 2 plain..	23 00	21 75
Hamilton, No. 1.....	23 00	21 75
Hamilton, No. 2.....	23 00	21 75

## FINISHED IRON AND STEEL.

Per Pound to Large Buyers.	Cents.
Common bar iron, f.o.b., Toronto..	2 50
Steel bars, f.o.b., Toronto.....	2 75
Common bar iron, f.o.b., Montreal	2 50
Steel bars, f.o.b., Montreal .....	2 75
Twisted reinforcing bars .....	2 55
Bessemer rails, heavy, at mill....	1 25
Steel bars, Pittsburgh .....	.....
Tank plates, Pittsburgh .....	.....
Beams and angles, Pittsburgh....	.....
Steel hoops, Pittsburgh .....	1 75
F.O.B., Toronto Warehouse.	Cents.
Steel bars .....	2 50
Small shapes .....	2 75
Warehouse, Freight and Duty to Pay.	Cents.
Steel bars .....	2 20
Structural shapes .....	2 20
Plates .....	2 20

Freight, Pittsburgh to Toronto.

18.9 cents carload; 22.1 cents less carload.

## BOILER PLATES.

	Montreal	Toronto
Plates, 1/4 to 1/2 in., 100 lb. \$2 35	\$2 35	\$2 35
Heads, per 100 lb. ....	2 60	2 60
Tank plates, 3-16 in. ....	2 70	2 70

## OLD MATERIAL.

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light .....	\$12 75	\$12 75
Copper, crucible .....	15 25	15 00
Copper, uneh-bleed, heavy	14 75	14 50
Copper, wire, uneh-bleed..	14 75	14 50
No. 1 machine compos'n	11 75	11 75
No. 1 compos'n turnings	10 25	10 00
No. 1 wrought iron ....	10 00	9 50
Heavy melting steel ....	9 00	9 00
No. 1 machin'y cast iron	13 50	13 00
New brass clippings....	11 00	11 00
No. 1 brass turnings....	9 00	9 00
Heavy lead .....	5 00	5 00

Tea lead .....	\$ 4 00	\$ 4 00
Scrap zinc .....	12 50	12 00

## W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect Nov. 5, 1915:

	Buttwell Black Standard	Gal.	Lapweld Black	Gal.
1 1/4, 3/8 in. ....	62	38 1/2	.....	.....
1 1/2 in. ....	67	47 1/2	.....	.....
3/4 to 1 1/2 in. ..	72	52 1/4	.....	.....
2 in. ....	72	52 1/2	68	48 1/2
2 1/2 to 4 in. ....	72	52 1/2	71	51 1/2
4 1/2, 5, 6 in. ....	.....	.....	69	49 1/2
7, 8, 10 in. ....	.....	.....	66	44 1/2
	X Strong	P. E.		
1 1/4, 3/8 in. ....	55	38 1/2	.....	.....
1 1/2 in. ....	62	45 1/2	.....	.....
3/4 to 1 1/2 in. ..	66	49 1/2	.....	.....
2, 2 1/2, 3 in. ....	67	50 1/2	.....	.....
2 in. ....	.....	.....	62	45 1/2
2 1/2 to 4 in. ....	.....	.....	65	48 1/2
4 1/2, 5, 6 in. ....	.....	.....	65	48 1/2
7, 8 in. ....	.....	.....	58	39 1/2
	XX Strong	P. E.		
1 1/2 to 2 in. ....	43	26 1/2	.....	.....
2 1/2 to 6 in. ....	.....	.....	42	25 1/2
7 to 8 in. ....	.....	.....	39	20 1/2
	Genuine Wrot Iron.			
3/8 in. ....	56	32 1/2	.....	.....
1/2 in. ....	61	41 1/2	.....	.....
3/4 to 1 1/2 in. ..	66	46 1/2	.....	.....
2 in. ....	66	46 1/2	62	42 1/2
2 1/2, 3 in. ....	66	46 1/2	65	45 1/2
3 1/2, 4 in. ....	.....	.....	65	45 1/2
4 1/2, 5, 6 in. ....	.....	.....	62	42 1/2
7, 8 in. ....	.....	.....	59	37 1/2
	Wrought Nipples.			
4 in. and under .....	.....	.....	77 1/2	67
4 1/2 in. and larger .....	.....	.....	72	67
4 in. and under, running thread.	.....	.....	57 1/2	67
	Standard Couplings.			
4 in. and under .....	.....	.....	60	60
4 1/2 in. and larger .....	.....	.....	40	67

## MILLED PRODUCTS.

Sq. & Hex Head Cap Screws 65 & 50	.....
Sq. Head Set Screws .....	70 & 50
Rd. & Fil. Head Cap Screws....	45%
Flat & But. Head Cap Screws....	40%
Finished Nuts up to 1 in. ....	70%
Finished Nuts over 1 in. ....	70%
Semi-Fin. Nuts up to 1 in. ....	70%
Semi-Fin. Nuts over 1 in. ....	72%
Studs .....	65%

## METALS.

	Montreal.	Toronto.
Lake Copper, carload ...	\$21 00	\$20 50
Electrolytic copper ....	21 00	20 25
Castings, copper .....	20 50	20 25
Tin .....	48 00	48 00
Spelter .....	20 00	21 00
Lead .....	6 75	7 00
Antimony .....	42 00	40 00
Aluminum .....	62 00	65 00

Prices per 100 lbs.

## BILLETS.

	Per Gross Ton
Bessemer, billets, Pittsburgh...	\$27 00
Open-hearth billets, Pittsburgh..	28 00
Forging billets, Pittsburgh .....	48 00
Wire rods, Pittsburgh .....	37 00

## NAILS AND SPIKES.

Standard steel wire nails, base .....	\$2 60	\$2 55
Cut nails .....	2 50	2 70
Miscellaneous wire nails..	75 per cent.	
Pressed spikes, 5/8 diam., 100 lbs.	2 85	

## BOLTS, NUTS AND SCREWS.

	Per Cent.
Coach and lag screws .....	70
Stove bolts .....	80
Plate washers .....	40
Machine bolts, 3/8 and less .....	65
Machine bolts, 7-16 and over....	50-7 1/2
Blank bolts .....	50-7 1/2
Bolt ends .....	50-7 1/2
Machine screws, iron, brass....	35
Nuts, square, all sizes ...	3 3/4 c per lb off
Nuts, hexagon, all sizes...	4 1/4 c per lb. off
Iron rivets .....	72 1/2
Boiler rivets, base, 3/4-in. and larger .....	\$3.75
Structural rivets, as above .....	3.75
Wood screws, flathead, bright .....	85, 10, 7 1/2, 10 p.e. off
Wood screws, flathead, brass .....	75 p.e. off
Wood screws, flathead, bronze .....	70 p.e. off

## LIST PRICES OF W. I. PIPE.

Standard.	Price.	Extra Strong.	D. Ex. Strong.
Nom. Diam.	per ft.	Sizes Ins.	Price per ft.
1 1/8 in	\$ .05 1/2	1 3/8 in	\$ .12
1 1/4 in	.06	1 1/4 in	.07 1/2
3/8 in	.06	3/8 in	.07 1/2
1 1/2 in	.08 1/2	1 1/2 in	.11
1 in	.11 1/2	1 in	.15
1 1/4 in	.17 1/2	1 1/4 in	.22
1 1/2 in	.23 1/2	1 1/2 in	.30
2 in	.27 1/2	2 in	.36 1/2
2 1/2 in	.37	2 1/2 in	.50 1/2
3 in	.58 1/2	3 in	.77
3 1/2 in	.76 1/2	3 1/2 in	1.03
4 in	.92	4 in	1.25
4 1/2 in	1.09	4 1/2 in	1.50
5 in	1.27	5 in	1.80
6 in	1.48	6 in	2.08
7 in	1.92	7 in	2.86
8 in	2.38	8 in	3.81
9 in	2.50	9 in	4.34
10 in	2.88	10 in	4.90
11 in	3.45	11 in	5.48
12 in	3.20	12 in	.....
14 in	3.50	14 in	.....
16 in	4.12	16 in	.....



**COKE AND COAL**

Solvay Foundry Coke .....	\$6.25
Connellsville Foundry Coke .....	5.65
Yough Steam Lump Coal .....	3.63
Penn. Steam Lump Coal .....	3.63
Best Slack .....	2.99

Net ton f.o.b. Toronto.

**COLD DRAWN STEEL SHAFTING**

At mill .....	30%
At warehouse .....	20%

Discounts off new list. Warehouse price at Montreal and Toronto.

**MISCELLANEOUS**

Solder, half-and-half .....	0.25
Putty, 100-lb. drums .....	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.65
Glue, French medal, per lb. ....	0.15
Tarred slaters' paper, per roll ...	0.95
Motor gasoline, single bbls., gal.	0.23 1/2
Benzine, single bbls., per gal. ....	0.23
Pure turpentine, single bbls. ....	0.85
Linseed oil, raw, single bbls. ....	0.85
Linseed oil, boiled, single bbls....	0.88
Plaster of Paris, per bbl. ....	2.50
Plumbers' Oakum, per 100 lbs....	4.50
Lead Wool, per lb. ....	0.11
Pure Manila rope .....	0.16
Transmission rope, Manila .....	0.20
Drilling cables, Manila .....	0.17
Lard oil, per gal .....	0.73
Union thread cutting oil .....	0.60
Imperial quenching oil.....	0.35

**POLISHING DRILL ROD**

Discount off list, Montreal and Toronto .....	40%
---	-----

**PROOF COIL CHAIN.**

1/4 in. ....	\$9.00
5-16 in. ....	5.90
3/8 in. ....	4.95
7-16 in. ....	4.65
1/2 in. ....	4.40
9-16 in. ....	4.05
5/8 in. ....	4.30
3/4 in. ....	4.15
7/8 inch .....	3.65
1 inch .....	3.45

Above quotations are per 100 lbs.

**TWIST DRILLS.**

Carbon up to 1 1/2 in. ....	55
Carbon over 1 1/2 in. ....	25
High Speed .....	
Blacksmith .....	55
Bit Stock .....	60 and 5
Centre drill .....	20
Ratchet .....	20
Combined drill and c.t.s.k. ....	15

Discounts off standard list.

**REAMERS**

Hand .....	25
Shell .....	25
Bit Stock .....	25
Bridge .....	65
Taper Pin .....	25
Centre .....	25
Pipe Reamers.....	80

Discounts off standard list.

**IRON PIPE FITTINGS.**

Canadian malleable, A, 25 per cent.; B and C, 35 per cent.; cast iron, 60; standard bushings, 60 per cent.; headers, 60; flanged unions, 60; malleable bushings, 60; nipples, 75; malleable, lipped unions, 65.

**TAPES**

Chesterman Metallic, 50 ft. ....	\$2.00
Lufkin Metallic, 603, 50 ft. ....	2.00
Admiral Steel Tape, 50 ft. ....	2.75
Admiral Steel Tape, 100 ft. ....	4.45
Major Jun., Steel Tape, 50 ft. ...	3.50
Rival Steel Tape, 50 ft. ....	2.75
Rival Steel Tape, 100 ft. ....	4.45
Reliable Jun., Steel Tape, 50 ft. ..	3.50

**SHEETS.**

	Montreal	Toronto
Sheets, black, No. 28....	\$3 30	\$3 00
Canada plates, dull.		
52 sheets . . . . .	3 15	3 15
Canada Plates, all bright..	4 60	4 75
Apollo brand, 10 3/4 oz.		
galvanized . . . . .	5 50	4 80
Queen's Head, 28 B.W.G.	6 00	5 95
Fleur-de-Lis, 28 B. W. G...	5 75	5 75
Gorbal's Best, No. 28 ...	6 00	6 00
Viking metal, No. 28 ...	5 25	5 25
Colborne Crown, No. 28..	5 70	5 80
Premier No. 28 .....	5 40	5 20

**BOILER TUBES.**

Size	Seamless	Lapwelded
1 in. ....	\$14 25	....
1 1/4 in. ....	15 00	....
1 1/2 in. ....	15 00	....
1 3/4 in. ....	15 00	....
2 in. ....	15 00	....
2 1/4 in. ....	16 50	9 25
2 1/2 in. ....	17 50	10 50
3 in. ....	25 00	12 25
3 1/2 in. ....	28 00	14 50
4 in. ....	33 00	18 50

Prices per 100 feet, Montreal and Toronto.

**WASTE.**

	WHITE.	Cents per lb.
XXX Extra .....	0 11 1/2	
X Grand .....	0 11	
XLGR .....	0 10 1/4	
X Empire .....	0 09 1/2	
X Press .....	0 08 3/4	

**COLORED.**

Lion .....	0 07 3/4
Standard .....	0 07
Popular .....	0 06 1/4
Keen .....	0 05 1/2

**WOOL PACKING.**

Arrow .....	0 17
Axle .....	0 12
Anvil .....	0 09
Anchor .....	0 07

**WASHED WIPERS**

Select White .....	0 08 1/2
Mixed Colored .....	0 06 1/4
Dark Colored .....	0 05 1/4

This list subject to trade discount for quantity.

**BELTING RUBBER**

Standard .....	.50%
Best grades .....	.30%

**BELTING—NO. 1 OAK TANNED.**

Extra heavy, single and d'ble, 40 & 10%	
Standard .....	50%
Cut leather lacing, No. 1.....	\$1.20
Leather in sides .....	1.10

**ELECTRIC WELD COIL CHAIN B.B.**

1/8 in. ....	\$12.75
3-16 in. ....	9.00
1/4 in. ....	6.00
5-16 in. ....	4.75
3/8 in. ....	3.75
7-16 in. ....	3.75
1/2 in. ....	3.75
5/8 in. ....	3.60
3/4 in. ....	3.60

Prices per 100 lbs.

**PLATING CHEMICALS**

Acid, boracic .....	\$ .15
Acid, hydrochloric .....	.05
Acid, hydrofluoric .....	.06
Acid, nitric .....	.10
Acid, sulphuric .....	.05
Ammonia, aqua .....	.08
Ammonium carbonate .....	.15
Ammonium chloride .....	.11
Ammonium hydrosulphuret .....	.35
Ammonium sulphate .....	.07
Arsenic, white .....	.10
Copper sulphate .....	.10
Cobalt sulphate .....	.50
Iron perchloride .....	.20
Lead acetate .....	.16
Nickel ammonium sulphate .....	.10
Nickel carbonate .....	.50
Nickel sulphate .....	.15
Potassium carbonate .....	.40
Potassium sulphide (substitute)..	.20
Silver chloride .....	(per oz.) .65
Silver nitrate .....	(per oz.) .45
Sodium bisulphite .....	.10
Sodium carbonate crystals .....	.04
Sodium cyanide, 127-130% .....	.35
Sodium hydrate .....	.04
Sodium hyposulphite (per 100 lbs.)	3.00
Sodium phosphate .....	.14
Tin chloride .....	.45
Zinc chloride .....	.20
Zinc sulphate .....	.07

Prices Per Lb. Unless Otherwise Stated.

**ANODES**

Nickel .....	.47 to .52
Cobalt .....	1.75 to 2.00
Copper .....	.22 to .25
Tin .....	.45 to .50
Silver .....	.55 to .60
Zinc .....	.22 to .25

Prices Per Lb.

**PLATING SUPPLIES**

Polishing wheels, felt ....	1.50 to 1.75
Polishing wheels, bullneck.	.80
Emery in kegs .....	.41 1/2 to .06
Pumice, ground .....	.05
Emery glue .....	.15 to .20
Tripoli composition .....	.04 to .06
Crocus composition .....	.04 to .06
Emery composition .....	.05 to .07
Rouge, silver .....	.50
Rouge, nickel and brass...	.15 to .25

Prices Per Lb.

# The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

**Montreal, Que., Nov. 22, 1915**—Optimism arising from the harvesting of a record crop continues to develop, and the general feeling is that even should the demand for war supplies tend in coming months to show a falling off and ultimately cease, an era of industrial prosperity is in process of materializing. The turn of the year is expected to bring about much activity in railroad betterment and shipbuilding, the latter probably attaining a prominence hitherto unknown in Canadian experience.

## Pig Iron

The demand for pig iron for steel making continues to tax the blast furnaces to capacity. Producers are filled up with orders for months ahead and are not inclined to take futures until they see the effect that the present conditions will have upon the market. Some are holding out on orders with the expectation that higher prices will prevail. Local dealers have not further advanced prices, but state that an increase may be made before the close of the present month.

## Steel

Last week's action of the United States Steel Corporation in withdrawing quotations on foreign trade, does not mean that this condition of affairs will prevail for any great length of time, as similar steps have been taken in the past when domestic conditions showed signs of congestion. The present situation is the result of most of the mills being booked up several months ahead and because many of them are unable to give delivery until well into the first half of the coming year. The needs of the war have taken precedence over the domestic demand, and the latter is therefore suffering to some extent.

United States quotations show advances, but locals remain unchanged. However, all indications are that prices will show sharp advances in the immediate future.

The abnormal demand for high speed steel is putting this necessary material almost beyond the reach of the manufacturer. Present quotations range from \$2.50 to \$3.00 per pound.

The demand for sheets continues brisk, with prices unchanged.

## Machine Tools and Supplies

Little or no change is noted in the machine tool situation. The demand for certain tools continues, but with uncertainty of delivery. Many shell-mak-

ing establishments are receiving machines which were ordered six or eight months ago, and supplementary machinery is being secured wherever possible.

Within the next two or three months, those firms successful in securing orders for the large shells will be equipping plants with heavy tools, suitable for the work.

## Metals

The metal situation is gathering strength and quotations are advancing. Heavy demands and increased activity in the copper trade is responsible for the advance of the past week. The abnormal consumption of copper by the large manufacturing centres far exceeds that of any previous record.

**Copper**—Producers are beginning to feel the strain of the demand for copper, and the Lake companies have, in some instances, declined to give quota-

## CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

tions, as they carry orders that will take many months to fill. Many of the buyers for war purposes are not yet satisfied, and further advances are looked for. Domestic demand is below normal. A general advance of 1c per lb. is shown in this week's figures. Lake copper, carload and electrolytic is quoted at 21 cents per pound, while casting has advanced to \$20.50 per hundred pounds.

**Tin**—Developments in the tin situation are keeping the markets in a state of uncertainty. Conditions in the Mediterranean and the Suez Canal continue to keep prices strong. The advance of \$7 noted in last week's quotations is this week increased another \$3, making an increase of \$10 per 100 lbs. in two weeks.

**Spelter**—This keeps very firm with advances shown in all quarters. The scarcity shown in London lately has resulted in an advance in price, and immediate delivery is securing good figures. Future delivery is also holding firm. Local dealers have advanced their prices

\$20 per ton and are now quoting 20 cents per lb.

**Lead**—Local dealers report firmness with the usual activity and a slight advance over the previous week. Present price per 100 pounds is \$6.75.

**Antimony**—This is still showing a tendency to advance. Buying is heavy, due to the increased call of war munitions. This week shows an advance to \$42 per hundred pounds.

**Aluminum**—This keeps firm at 62 cents per pound.

## Old Materials

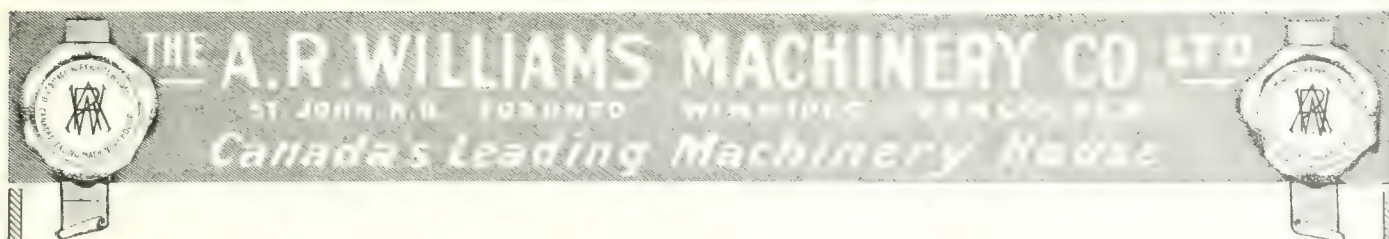
Dealers in scrap metals report business normal, with no advance in prices. However, the situation may call for many changes before the close of the present week. The advances shown in the various metals will naturally have their effect upon old material and increases are looked for shortly.

**Toronto, Ont., Nov. 23.**—The greatest activity continues in the steel trade and munitions industry, while the industrial situation generally is looking brighter. Both domestic and export trade is improving and there is a more optimistic feeling with regard to the future outlook. Conditions are to a considerable extent abnormal, and the slackening in trade usually experienced during the winter months will probably not be so noticeable this year. War orders will assist materially in keeping factories busy and make up for loss of normal business. Indications point to considerably less unemployment this winter and to improved economic conditions throughout the country.

That the export trade continues to increase in volume is clearly shown in the trade returns for October recently issued by the Department of Trade and Commerce. The exports for the month were valued at eighty million dollars, or nearly double those for the corresponding month of 1914. The total Canadian trade for October, 1915, was eleven million dollars ahead of October, 1914, while for the seven months of this fiscal year the increase is sixty-nine million dollars more than for the corresponding period of last year. An interesting feature of the business expansion is the continued improvement in the balance of trade towards this country.

The situation with regard to the munitions industry is practically unchanged. Orders for the large calibre shells are being placed, but in what quantities is not generally known. The Munitions Committee has fixed the price of steel for shells at 3½ cents per pound. A shortage of copper bands has developed and is causing considerable inconvenience to some firms working on shells.





## THE VALUE OF SERVICE RENDERED

is something we are rather proud of. Not content, however, with past achievements or length of service, we are fully prepared to satisfy all demands made upon us NOW. Your problem is our opportunity.

Particularly is this the case for Shell Machinery—whether for 6", 8", or 9.2"—we are ready to specify on complete layout and equipment.

Our Service Department for months past has been engaged in collecting, and have now assembled all the requisite data for manufacturing the new types of Heavy High Explosive Shells. We anticipated this and are therefore prepared to furnish any special type of machine, or complete equipment, for entire plants.

We guarantee Plants equipped and ready to manufacture in four to eight weeks after order is received.

**The A. R. Williams Machinery Company, Limited**  
Toronto, Canada

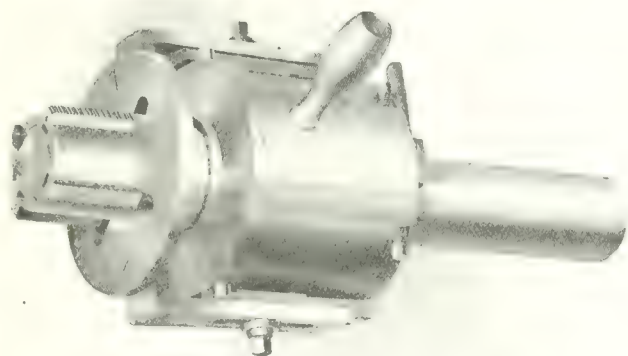
IF IT'S MACHINERY—WRITE "WILLIAMS"

## WHAT DOES IT COST

To back a Solid Tap out of the work every time a thread is cut? Consider the damage to the threads and the number of broken taps.

DO YOU KNOW ABOUT THE

## Geometric Adjustable Collapsing Tap



Geometric Adjustable Tap, Class "A" Tap, equipped with  
Geometric Collapsing Tap

that requires no backing off?

Applied to your Drill Press or Turret Lathe, it will do better work, in half the time, than solid taps.

GEOMETRIC COLLAPSING TAPS are as rigid as solid taps while cutting, but collapse their chasers automatically when the required depth has been tapped.

*Send for the Catalogue.*

**THE GEOMETRIC TOOL CO.**

NEW HAVEN, CONN., U.S.A.

Williams & Wilson, Ltd., Montreal.

Canadian Agents:  
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

### Steel Market

Owing to the fact that American mills have withdrawn prices on a number of steel products from this market, and that they are not for the present soliciting business in Canada, prices on Pittsburgh bars, plates and shapes will not be given in the selected market quotations until further notice. Steel companies in the States are unable to accept new business from this market as their output is booked up for several months ahead and furthermore prices are so variable that a firm quotation cannot be listed with any degree of accuracy.

Canadian mills have advanced prices on steel bars 25 cents, and are quoting \$2.75 per 100 pounds, Toronto. Quotations on iron bars are unchanged at \$2.50 per 100 pounds. Prices on steel bars are subject to change without notice and quotations are made only for immediate acceptance. The market is very strong and active and every indication points to still higher levels. The demand for steel for shells continues to increase and the capacity of the mills will be taxed to the limit to take care of the tonnage that will be required for the new orders for munitions. The steel industry is passing through a phenomenal period of prosperity which will benefit the trade to a degree never anticipated as recently as twelve months ago. No other price changes except the ones noted above have been made this week, but boiler tubes and boiler plates will no doubt advance in the near future. Bolts, nuts and wrought iron pipe are very firm and higher prices are anticipated.

Prices of galvanized sheets are firm and are expected to advance. The market is unsettled and it is said that some makers have practically withdrawn from the market. The scarcity of steel is affecting the sheet makers, acid is scarce and high, while the abnormal price of spelter is also an important factor in the situation.

In the United States the market is very strong and prices on steel products continue to advance. Steel companies are extending their plants and are operating at capacity. Many mills have their output sold for four and five months ahead, and some for the first half of next year. There is a very heavy demand for steel bars for munitions and prices are going higher. Steel bars, plates and shapes are now being quoted at 1.70c Pittsburgh. Bessemer and forging billets are higher and are being quoted at \$27 and \$48 per ton Pittsburgh, respectively. Wire rods have advanced, and are now quoted at \$37 f.o.b. Pittsburgh. Black sheets are higher at \$2.25 Pittsburgh.

### Pig Iron

The market is strong and prices of domestic and American pig iron are

higher. Hamilton and Victoria brands have advanced 75c and are now quoted at \$21.75 per ton, Toronto. Grey forge has advanced to \$15.95 Pittsburgh, while Lake Superior charcoal is now quoted at \$17.25 f.o.b. Chicago. The pig iron market is becoming more active in sympathy with that of steel. There is a heavy demand for steel making grades. Canadian consumers are buying heavily in the States, but cannot get all the tonnage they require.

### Old Materials

The market is firm with improved demand for copper scrap and heavy melting steel. Prices are considerably firmer, and zinc has advanced 1c, being now quoted at 12c per pound. No. 1 wrought iron and No. 1 machinery cast iron are both stronger and higher. All grades of grass are in good demand and prices are firm.

### ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

International Purchasing Commission, India House, Kingsway, London, Eng.

French.—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendance Ministere de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian.—Messrs. S. Ruperti and Alexsieff, care Military Attache, Russian Embassy, Washington, D.C.

### Machine Tools

The situation in the machine tool market is much the same as last week. Dealers are very busy figuring on tools for the large shells and have sold a number of lathes for machining the 6-in. type. A large number of lathes, 24-in. to 30-in. swing, will be required for the large shells, and it is understood that a considerable amount of business is ready to be placed by the various firms who are preparing to undertake their manufacture. Prices of lathes and other tools have advanced considerably, but deliveries on the large size lathes are not as backward as on the smaller tools. Second-hand tools suitable for shell work have risen in price, and are not so easy to obtain as formerly, the market having become depleted.

### Supplies

The market continues active and

prices are firm. There are no price changes of importance to note this week but there is an upward tendency in some lines. Linseed oil is expected to advance again. Waste is firm and in good demand. Higher prices are anticipated for red lead, and lead wool may also advance.

### Metals

The market is steady and there are no price changes to note with the single exception of spelter which has advanced again. The tin market which advanced sharply last week on a report that the Suez Canal was closed is now weak as a result of this rumor having been proved incorrect. Copper is higher in London, but unchanged here. The advance in spelter is due to a scarcity of this metal and an apparent attempt to excite the market. The lead market is firm but unchanged. Considerable strength has developed in the antimony market and prices are very firm. The scarcity of aluminum continues and prices are nominal.

**Tin.**—The strong market which developed last week has not been maintained and the market is now dull and weak. The Suez Canal scare had apparently no foundation in fact, consequently the market fell off, but recovered later. There is a scarcity of spot tin and should business improve the price might advance. Local quotations are unchanged at 48c per pound.

**Copper.**—The market is strong and higher in London. There has been some heavy buying recently, and it is thought that the market will go higher before the movement stops. Local quotations are firm and unchanged at 20c per pound.

**Spelter.**—The market is unsettled and quotations nominal. A scarcity of spelter in London has resulted in a further advance in prices for prompt and end of November requirements; futures, however, are selling at a discount. Spelter has advanced 2c and quotations are nominal at 20c per pound.

**Lead.**—The market is quiet but firm. The "Trust" price is being well held at \$5.25, New York, and it is probable that it may advance. Local quotations are unchanged at 7c per pound.

**Antimony.**—The market is very strong with an upward tendency. There is a scarcity of spot antimony and a large business is being done in futures. In the London market, the price of antimony is controlled by the British Government which helps to steady the market. Local quotations are firm and unchanged at 40c per pound.

**Aluminum.**—The situation is unchanged and supplies are still very difficult to obtain. Quotations are unchanged at 65c per pound.



## Would You Expect the Judgment of Such Firms as These to be Sound?

One or two of them MIGHT be mistaken—but is it likely they ALL were when they selected the International Time Recording Company system in preference to all others?

Acton Publishing Company  
Aikenhead Hardware Co.  
Autosales Gum & Chocolate Co.  
A. A. Allan Limited  
W. H. Banfield & Son  
Beal Bros.  
Beardmore & Co.  
Blackhall & Co.  
Boake Manufacturing Co.  
S. F. Bowser Company  
British American Oil Co.  
Brigdens Limited  
Brown Bros.  
F. N. Burt Co.  
Canadian Carpet Co.  
Canadian Fairbanks-Morse Co.  
Canadian General Electric Co.  
Canadian Kodak Company

Dominion Radiator  
R. G. Dun  
Dunlop Tire & Rubber Co.  
T. Eaton Co.  
Eby, Blain Limited  
H. P. Eckhardt Co.  
Firstbrook Box Co.  
Flett, Lowndes Co.  
E. W. Gillett Co.  
Abitibi Power & Paper Co.  
Goodyear Tire & Rubber Co.  
Gourlay, Winter & Leeming  
Geo. Hees & Son.  
Heintzman & Co.  
Canadian Rumley Company  
City Dairy  
Confederation Life Association  
Consumers' Gas Co.

Copeland, Chatterson Co.  
Canadian Pacific Railway Co.  
Canadian Rolling Mills Limited  
Canadian Steel Foundries  
Canada Carbide Co.  
Canada Cement  
Canada Sugar Refining Co.  
Dominion Guarantee  
Dominion Iron & Steel Co.  
Ford Motor Company  
Hudson Bay Knitting Co.  
Ideal Bedding Co.  
W. R. Johnston Co.  
Julian Sale Leather Co.  
Ambrose Kent & Sons  
Massey-Harris Co.  
Mathews, Blackwell Co.  
Methodist Book Room

MacDonald Manufacturing Co.  
McLaughlin Carriage Co.  
McLean Publishing Co.  
Nasmith Co.  
Ontario Wind Engine Co.  
Russell Motor Car Co.  
Salada Tea  
Saturday Night  
Toronto Carpet Co.  
Toronto Electric Light  
Toronto Street Railway  
Toronto Type Foundry  
Turnbull Elevator Co.  
A. R. Williams Machinery  
Alaska Feather & Down Co.  
Ames, Holden, McCready Co.  
Canadian Car & Foundry

The International Time-card System shows every employee in figures of his own making, IN RED, exactly how much time he has lost during the week. This record saves all disputes and, incidentally, greatly facilitates the pay-roll make up, as the cards can be distributed amongst several clerks. A big loss of time known as "walking time" between door and bench can

also be entirely eliminated. These are only a few of the many excellent and exclusive features of the International Time-card System.

We are the largest manufacturers of Time Recording Systems in the world. Our advice is free to manufacturers who wish to improve their cost keeping systems. Correspondence is invited.

## International Time Recording Company of Canada, Limited Ryrie Bldg., Corner Shuter and Yonge Sts., TORONTO

F. E. MUTTON,  
General Manager

Montreal Representative: CHARLES COLE  
Cartier Bldg., McGill & Notre Dame Streets

## Advertisers Cannot Be Overlooked

Being in the background of a manufacturer's mind at a moment which decides the direction business shall take, may mean serious losses. When you advertise you cannot be overlooked—you always receive consideration—a consideration above that accorded the house that does not see the benefit of talking to the manufacturer when he has the time to listen—when he sits down to read *Canadian Machinery*.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

**GRAIN EXPORTS REDUCED**

WITH little prospect of improved conditions in the month of November, reports of this year's grain exports through the port of Montreal up to the end of October show a distinct falling off as compared with the corresponding period last year, while a large increase of grain shipped from many of the Atlantic ports of the United States is recorded.

The total amount of grain exported from Montreal to October 31 of the current year is 34,664,528 bushels, according to reports compiled by the Board of Trade, as compared with 58,112,000 bushels for the corresponding period of 1914, a decrease of 23,447,472 bushels. The total for this year is made up of 27,807,108 bushels wheat, and 5,886,000 bushels oats, the remainder being corn and barley.

Total exports of grain from St. John, N.B., for the same period, show a smaller diminution as compared with last year,

the figures, as compiled by the Consolidated News Statistics and Transportation Bureau, of Philadelphia, being 5,174,000 bushels for 1915, and 5,556,000 bushels for 1914.

**OCTOBER EXPORTS NEARLY DOUBLED**

THE feature of the monthly statement of Canada's trade, issued on November 19, by the Hon. J. D. Reid, Minister of Customs, is the very substantial increase in the volume of exports. For the month of October last, Canada exported eighty million dollars worth of goods, or nearly double the exports for the corresponding month of 1914.

There are increases all along the line, the chief being agriculture, \$39,833,000, compared with \$17,900,000 for October, 1914; animals and their product, October, 1915, \$12,000,000; October, 1914, \$8,000,000; manufactured goods, October, 1915, \$12,800,000; October, 1914, \$7,100,000; minerals, \$6,600,000, compared with

\$5,104,000, while there is a substantial increase in the export of fisheries and lumber.

The exports for October doubled the imports for the same period, the imports being \$39,000,000, made up of \$22,800,000 dutiable goods, and \$16,700,000 free goods.

The total Canadian trade for October, 1915, was \$150,000,000, compared with \$139,000,000 for the corresponding month last year. The statement shows that the Canadian trade for the seven months ended October last was \$709,000,000, compared with \$640,000,000 for the corresponding seven months of 1914. For the seven months ended October last, the exports of agricultural products reached \$100,000,000, compared with \$75,000,000 for the corresponding period of 1914. For the seven months of the present fiscal year the exports were largely in excess of the imports, the latter being \$253,000,000, and the domestic exports \$336,000,000.

**CANADIAN COMMERCIAL INTELLIGENCE SERVICE**

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

**CANADIAN TRADE COMMISSIONERS.**

<b>Argentine Republic.</b>	
H. R. Ponssett, Reconquista, No. 16, Buenos Aires. Cable address, Canadian.	
<b>Australasia.</b>	
D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.	
<b>British West Indies.</b>	
F. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.	
<b>China.</b>	
J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancom.	
<b>Cuba.</b>	
Acting Trade Commissioner, Leon de Camacho Apartado 1290, Havana. Cable address, Cantracom.	
<b>France.</b>	
Phillipe Rey, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.	
<b>Japan.</b>	
G. B. Johnson, P.O. Box 109, Yokohama. Cable address, Canadian.	
<b>Holland.</b>	
Acting Trade Commissioner, Zuidwal, 26, Rotterdam. Cable address, Watermill.	
<b>Newfoundland.</b>	
W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.	
<b>New Zealand.</b>	
W. A. Biddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.	
<b>South Africa.</b>	
W. J. Egan, New Union Buildings, Cape Town. Cable address, Cantracom.	
<b>United Kingdom.</b>	
E. de B. Arnold, Sun Building, Chancery Street, Bristol. Cable address, Canadian.	
J. E. Ray, Central House, Birmingham. Cable address, Cantracom.	
Acting Trade Commissioner, North British Building, East Parade, Leeds. Cable address, Canadian.	
F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.	
J. Forsythe Smith, Fruit Trade Commissioner, Canada Chambers, 36 Spring Gardens, Manchester.	
J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.	
Harrison Watson, 73 Lasinghall Street, London, E.C., England. Cable address, Sleighing, London.	

**SPECIAL TRADE COMMISSIONER—LUMBER.**

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

**CANADIAN COMMERCIAL AGENTS.**

<b>British West Indies.</b>	
Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.	
R. H. Curry, Nassau, Bahamas.	
<b>Norway and Denmark.</b>	
C. E. Sontum, Grubbege No. 4, Christiania, Norway. Cable address, Sontums.	
<b>South Africa.</b>	
D. M. McKee, Room 31, Postnet Buildings, Harrison Street, Johannesburg.	
E. J. Wilkison, Durban, P.O. Box 674, Durban, Natal.	

**CANADIAN HIGH COMMISSIONER'S OFFICE.****United Kingdom.**

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England. Cable address, Dominion, London.



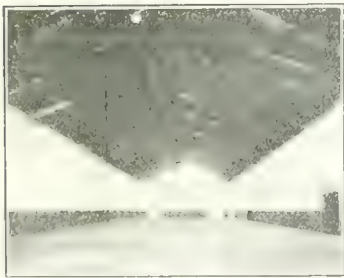


## JOHNS-MANVILLE SERVICE

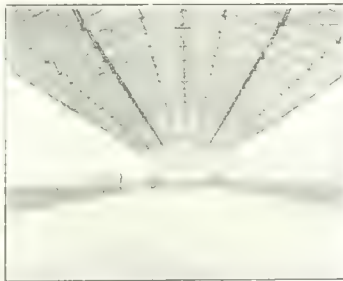


**I**N every important city of North America the Johns-Manville purchaser finds Johns-Manville Service. It exists for his benefit and in order that every J-M Product sold him may render continuous satisfaction.

## Actual service has proved that J-M Fireproof Cold Water Paint reduces lighting bills at least 25%



Before using J-M Cold Water Paint



After using J-M Cold Water Paint

Contains no oil, alkali, lime or injurious chemicals, so won't discolor with age nor harm hands or clothing. Being absolutely fireproof it is approved by the Fire Underwriters, therefore insurance premiums are often reduced where it is used.

It brightens up corners and dark places, thereby making daylight last longer and necessitating the use of fewer lights when working at night.

And in addition to this great saving, the productivity of employees is increased from 10 to 40%, according to local conditions.

J-M Cold Water Paint is composed of various minerals and cementing compounds and is mixed with ordinary water, which costs you practically nothing. Due to this economy, this paint costs only a fraction as much as oil paints. It covers a greater area and one layer covers better than two layers of oil paint.

J-M Fireproof Cold Water Paint, when applied according to simple directions, forms a hard, non-slip, sanitary and odorless coating which will not chalk, scale, peel, or rub off.

## The method to be used to carry steam underground is no longer a matter of experiment

Because facts point to the J-M Sectional Conduit System as being most efficient and economical. There are several considerations that must be given due thought in every underground steam line. (1) Efficiency—the ratio of the steam you send through the line to that which is received at the other end. (2) Cost—meaning total cost; that is, first cost, repairs, inspection and maintenance. (3) Durability—How long it will last, or “how soon must this system be renewed.” (4) Depreciation—which means the money you must earn, and save, to pay for the renewal of the installation when the present one is gone.

### J-M SECTIONAL CONDUIT

is the logical choice under all these considerations.

Efficiency—90% and up. Cost—lowest yet. Life—endless. Depreciation—negligible. Tests that prove this are yours for the asking. Tell us where to send them.



## The Canadian H. W. Johns-Manville Co., Ltd.

TORONTO

MONTREAL

WINNIPEG

VANCOUVER

*If what you want is not advertised in this issue, consult the Buyers' Director at the back.*

# INDUSTRIAL <sup>AND</sup> CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News.

## Engineering

**Vancouver, B.C.**—The Shell Company will build an oil refinery on Burrard Inlet.

**Seaforth, Ont.**—The Robert Bell Engine Co. have been awarded a contract for shells.

**Hamilton, Ont.**—The Acme Stamping Tool Works will make an extension to their plant to cost \$3,000.

**Vancouver, B.C.**—The molding shops of the Vancouver Engineering Works, were damaged in a recent fire.

**Leamington, Ont.**—The town council will purchase two 110 h.p. return-tube boilers for the pumping station.

**Montreal, Que.**—The Castings Co. of Canada, which was recently incorporated, will build a foundry at Valleyfield, near here.

**Fort William, Ont.**—The Fort William Coal Docks Company will build an extensive addition to its plant on Mission River, to cost \$200,000.

**Petrolia, Ont.**—A beet sugar refinery will probably be built by the Marine City Sugar Co. The cost of buildings and plant is estimated at \$800,000.

**Collingwood, Ont.**—It is reported that the Imperial Steel & Wire Co. have received an order for shells in addition to the order for war material recently announced.

**Orillia, Ont.**—The J. R. Eaton & Sons have received a contract for 25,000 six-inch shells. The company have for some time been working on a large order for ammunition boxes.

**Galt, Ont.**—Owing to trouble at the pumping station, the Waterworks Commission have practically decided to purchase another electric motor to drive one of the turbine pumps.

**Welland, Ont.**—The Electric Steel & Metals Co. are building a new machine shop 300 ft. long by 50 ft. wide, and an office building 50 ft. by 40 ft. An electric furnace is also being installed for turning out shell blanks.

**Montreal, P. Q.**—The Standard Steel Co., which has recently been incorporated, has taken over an existing foundry on Atlantic avenue. The plant will be equipped and operated as a steel foundry.

dry. An extension to the plant is contemplated.

**London, Ont.**—Plans for an addition to the Ford factory on Waterloo Street are being prepared, although no construction work will be started this year. The company has purchased a site, 180 by 232 feet, in the rear of its present building, on which the new structure will be erected.

**Dawson, Y. T.**—The steam generating plant of the Canadian-Klondike Mining Co. was completely destroyed by fire Oct. 30. The plant was used for driving dredges, heating the company's shops, etc. The machinery burned included three large water-tube boilers and a 400 k.w. steam turbine. The plant is to be rebuilt on a larger scale.

**Welland, Ont.**—The Canada Forge Co. will build an extension to their plant. The new building will have a ground area of 180 x 80 feet, and will be of structural steel. The cost is estimated at \$20,000, and the equipment to be installed will cost \$100,000. The building will be used for four additional hydraulic presses for making six-inch high-explosive shells. T. J. Dillon is manager.

**Vancouver, B.C.**—The recently organized Port Moody Steel Works, Ltd., are now busy clearing their site at Port Moody and anticipate within a short time starting construction work on their buildings, being far enough advanced early in the new year to start operations. The company has a 100-acre site at Port Moody and the council of that place have guaranteed bonds to the extent of \$100,000.

## Electrical

**Granton, Ont.**—A Hydro-Electric system will be installed here at a cost of \$5,000.

**Forest, Ont.**—The Town Council contemplate installing a Hydro-Electric system.

**Verdun, Que.**—Council is considering the extension of the electric lighting system.

**Granton, Ont.**—The Township of Biduloh purpose spending \$3,500 on a Hydro-Electric distribution system. A by-law will be voted on.

**Petrolia, Ont.**—Construction work on the hydro system has been suspended

because the Commission's recommendations have not been carried out.

**Orangeville, Ont.**—The county has passed a by-law guaranteeing the bonds of the corporation of the Town of Orangeville to the amount of \$33,000, repayable in 20 years, for the purchase of the plant of the Pine River Light and Power Co., and to provide for the cost of a plant to distribute electric power to be supplied by the Hydro-Electric Power Commission of Ontario.

**Eugenia Falls Plant.**—The new power plant at Eugenia Falls owned by the Ontario Hydro-Electric Commission was formerly opened by Sir Adam Beck on November 18th. The plant will serve a large section of the Georgian Bay district with electrical energy. The present capacity of the plant is 4,000 h.p., but 8,000 h.p. can be developed. The total head of water available is 450 feet. The plant represents a capital investment of \$600,000 and transmission lines and transformer stations \$500,000 more. Should the circumstances warrant, the Eugenia Falls plant can be linked up with the other two plants on the Severn, namely, Big Chute and Wasdall's Falls.

## Municipal

**London, Ont.**—The contemplated waterworks extensions include a pumping installation.

**Dryden, Ont.**—The Town Council are considering the question of installing a waterworks system.

**Port Dover, Ont.**—The town council contemplate making extensions to the waterworks system.

**Southampton, Ont.**—The installation of a hydro-electric system is under consideration by the town council.

**West Lorne, Ont.**—A by-law will be prepared to submit to the ratepayers to borrow \$8,000 for a hydro-electric system.

**Owen Sound, Ont.**—A by-law will be voted on by the ratepayers to authorize a loan of \$12,000 to the Owen Sound Shoe Mfg. Co.

**Peterborough, Ont.**—A by-law is being prepared covering a loan of \$3,500 to J. C. Ellis, who proposes building a mattress and bed spring factory.



## THE BANFIELD PLUG MILLER

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in three minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 16" x 4" with bronze bush having cut jaw clutch for turning and facing. Bronze worm gear 7:1 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 11 1/2" flanged pulley. The milling cutter is driven by an 8" x 2 1/2" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft (*all drives direct from main line shaft*). Rigidly built, simple and economical to operate.

BUILT EXCLUSIVELY BY

**Edwin J. Banfield**

STAIR BUILDING,

TORONTO, ONTARIO

For Turning, Facing and Milling the Thread on Gas Check Plugs for High Explosive Shells.

### HOISTING AND CONVEYING MACHINERY

Overhead Runways and Trolleys, Cranes, Dericks, Chain Blocks, Electric Hoists and Trolleys, Rope Blocks, Friction Hoists, Hydraulic and Hand Power Ash Hoists, Coal Handling Machines, Gravity Roller and Spiral Conveyors.

We Are Installing

## BEATH OVERHEAD TRACKS, TROLLEYS AND HOISTS

For Hoisting and Conveying

5-in., 6-in., 8-in. and 9.2-in. Shells

in the receiving, forging, machinery and shipping departments. Beath Overhead Runways require no floor space and are particularly adapted for this service.

The weight of these Shells have caused a new problem in handling that will have to be met and overcome by manufacturers of these heavier types of explosives.

*Let our engineering department show you how a Beath Overhead Runway can be made to fit into your requirements.*

**W. D. Beath & Son, Limited**

ENGINEERS AND MANUFACTURERS

20 Cooper Avenue

TORONTO

# FIRE BRICK

For  
Heat-Treating  
Furnaces, etc.

USING ELK FIRE BRICK IN LINING HEAT-TREATING FURNACES IS ANOTHER WAY OF ADDING TO THEIR EFFICIENCY, ECONOMY AND DURABILITY.

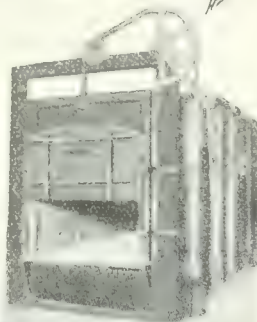
We carry in stock a large variety of shapes and sizes.

Write for catalog.

We can fill all orders promptly.

The Elk Fire  
Brick Co. of  
Canada, Ltd.

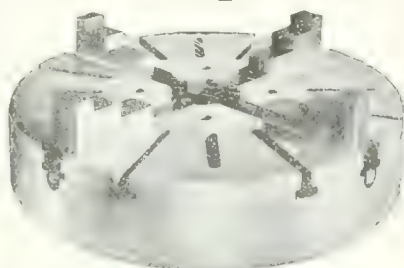
Federal Life  
Building,  
Hamilton,  
Ontario



## We Know

you are anxious to buy  
Canadian Made  
goods.

## The Imperial



Chuck  
is manufactured by  
Ker & Goodwin  
Brantford, Canada

**Brockville, Ont.**—The ratepayers have voted in favor of granting exemption of taxes to the Newell Manufacturing Co., who propose establishing a branch factory here.

**St. Marys, Ont.**—There is a prospect of St. Marys getting a new industry. A Michigan concern has written to council asking what terms the town could offer should it locate here.

**Edmonton, Alta.**—The City Council has decided to submit a by-law on December 13 authorizing an expenditure of \$275,000 on the construction of a sewage disposal plant.

**Regina, Sask.**—The city will install a new pumping unit at its waterworks plant to be driven by electricity, and have a capacity of 2,500,000 gal. per day and to cost \$12,000. George Beach is the clerk.

**Orillia, Ont.**—The by-law for raising \$50,000 for the purpose of rebuilding the town hall according to the plans prepared by Messrs. Burke, Horwood & White, was decisively defeated by the ratepayers on Nov. 17.

**Port Dover, Ont.**—Port Dover may shortly install a waterworks system. The town has two alternatives. Water can be brought by gravitation from Doan's Springs, which are two miles from the town. The other way is to take the water out of Lake Erie. It is proposed, if the latter plan is chosen, to build an intake pipe of 1,200 feet, and then have mechanical filters, which would be established near The Globe Park. E. A. James, of Toronto, is the engineer.

**Brockville, Ont.**—Seven tenders have been received by the Water and Light Commission for the proposed filter plant. The following alternative proposals are being considered: Barber & Grant, Toronto, A. \$34,000; B. \$94,500. New York Continental Jewel Co., A. \$35,000; B. \$87,128. Pittsburgh Filter Co., A. \$42,916; B. \$97,746. Roberts Filter Co., Darby, Pa., A. \$39,000; B. \$95,193; C. equipment only, \$36,500. Norwood Filter Co., Cowansville, Que., A. \$40,800; B. \$94,057.

## General Industrial

**St. Anns, N.S.**—The Cape Breton Pulp Co. will rebuild their plant which was recently destroyed by fire.

**Halifax, N.S.**—The Brandram-Henderson Co., paint and white lead manufacturers, will build a new factory.

**Fort Erie, Ont.**—The International Safe Co. will build an extension to their factory. S. A. Waugh is president.

**Parry Sound, Ont.**—An explosion at Nobel last Monday wrecked a section of the plant of the Canadian Explosives, Ltd.

**Kingston, Ont.**—The Separate School Board are considering the question of installing fire escapes on the school building here.

**Ingersoll, Ont.**—The Waterhouse Knitting Mills will be extended, the factory remodeled and new machinery installed. Thomas Waterhouse is the president.

**Haileybury, Ont.**—It is understood that the purchase from C. A. Foster of his sawmill here by the Riordon Paper Mills of Montreal, will be followed by the building of a large pulp and paper mill.

## Tenders

**Grand'Mere, Que.**—Tenders are being received for the supply of one 500 h.p. turbine and dynamo. Engineer, L. S. Pariseau, Montreal.

**St. Hyacinthe, Que.**—Tenders will be received up to December 14, for a mechanical filter plant. Plans and specifications may be obtained at the office of Hector Cadieux, city engineer.

**Toronto, Ont.**—Tenders will be received until Tuesday, Nov. 23, 1915, for

## USED MACHINERY

FOR IMMEDIATE DELIVERY

### MISCELLANEOUS

No. 1 Harbor Rogers Cutting Off Machine  
Style D Motion Cutting Off Machine  
No. 7 Cincinnati Gear Cutter  
Wilmart, Manton Drill Grinder  
2 H.P. 200 Vol. D.C. Polishing Lathe  
No. 60 Heald Cylinder Grinder  
Lincoln Miller (old style)  
10-25-30-35 H.P. 20 V.H. A.C. Motors  
No. 1 American Oil Extractor  
No. 200 Oil Extractor  
40 X 40 X 8 Gray Plaster No. 90  
40 X 40 X 8 Gray Plaster  
No. 1 Tap & Thread Shopper No. 40  
No. 1 Grind & Raising Machine

### BORING MACHINES

Speedy Newton Horizontal Cylindrical Boring Machine  
12" Bullard Vertical Boring Mill with two heads

### DRILL PRESSES

12" James Sliding Head  
10" 12" Sliding Head  
12" James Wheel Driven Vertical  
12" K. H. B. Vertical  
10" 2 Speed B. Rockwell  
10" Niles Plan. Radial  
15" 10" Graham App. 2000  
12" Hodge with tapping attachment  
Scotch Reel 10"  
Scotch Reel 12"  
Scotch Reel 14"

### LATHES

12" 14" 16" & 18" 6' 11" 12" 14" 16" 18" 20" 22" 24" 26" 28" 30" 32" 34" 36" 38" 40" 42" 44" 46" 48" 50" 52" 54" 56" 58" 60" 62" 64" 66" 68" 70" 72" 74" 76" 78" 80" 82" 84" 86" 88" 90" 92" 94" 96" 98" 100" 102" 104" 106" 108" 110" 112" 114" 116" 118" 120" 122" 124" 126" 128" 130" 132" 134" 136" 138" 140" 142" 144" 146" 148" 150" 152" 154" 156" 158" 160" 162" 164" 166" 168" 170" 172" 174" 176" 178" 180" 182" 184" 186" 188" 190" 192" 194" 196" 198" 200" 202" 204" 206" 208" 210" 212" 214" 216" 218" 220" 222" 224" 226" 228" 230" 232" 234" 236" 238" 240" 242" 244" 246" 248" 250" 252" 254" 256" 258" 260" 262" 264" 266" 268" 270" 272" 274" 276" 278" 280" 282" 284" 286" 288" 290" 292" 294" 296" 298" 300" 302" 304" 306" 308" 310" 312" 314" 316" 318" 320" 322" 324" 326" 328" 330" 332" 334" 336" 338" 340" 342" 344" 346" 348" 350" 352" 354" 356" 358" 360" 362" 364" 366" 368" 370" 372" 374" 376" 378" 380" 382" 384" 386" 388" 390" 392" 394" 396" 398" 400" 402" 404" 406" 408" 410" 412" 414" 416" 418" 420" 422" 424" 426" 428" 430" 432" 434" 436" 438" 440" 442" 444" 446" 448" 450" 452" 454" 456" 458" 460" 462" 464" 466" 468" 470" 472" 474" 476" 478" 480" 482" 484" 486" 488" 490" 492" 494" 496" 498" 500" 502" 504" 506" 508" 510" 512" 514" 516" 518" 520" 522" 524" 526" 528" 530" 532" 534" 536" 538" 540" 542" 544" 546" 548" 550" 552" 554" 556" 558" 560" 562" 564" 566" 568" 570" 572" 574" 576" 578" 580" 582" 584" 586" 588" 590" 592" 594" 596" 598" 600" 602" 604" 606" 608" 610" 612" 614" 616" 618" 620" 622" 624" 626" 628" 630" 632" 634" 636" 638" 640" 642" 644" 646" 648" 650" 652" 654" 656" 658" 660" 662" 664" 666" 668" 670" 672" 674" 676" 678" 680" 682" 684" 686" 688" 690" 692" 694" 696" 698" 700" 702" 704" 706" 708" 710" 712" 714" 716" 718" 720" 722" 724" 726" 728" 730" 732" 734" 736" 738" 740" 742" 744" 746" 748" 750" 752" 754" 756" 758" 760" 762" 764" 766" 768" 770" 772" 774" 776" 778" 780" 782" 784" 786" 788" 790" 792" 794" 796" 798" 800" 802" 804" 806" 808" 810" 812" 814" 816" 818" 820" 822" 824" 826" 828" 830" 832" 834" 836" 838" 840" 842" 844" 846" 848" 850" 852" 854" 856" 858" 860" 862" 864" 866" 868" 870" 872" 874" 876" 878" 880" 882" 884" 886" 888" 890" 892" 894" 896" 898" 900" 902" 904" 906" 908" 910" 912" 914" 916" 918" 920" 922" 924" 926" 928" 930" 932" 934" 936" 938" 940" 942" 944" 946" 948" 950" 952" 954" 956" 958" 960" 962" 964" 966" 968" 970" 972" 974" 976" 978" 980" 982" 984" 986" 988" 990" 992" 994" 996" 998" 1000" 1002" 1004" 1006" 1008" 1010" 1012" 1014" 1016" 1018" 1020" 1022" 1024" 1026" 1028" 1030" 1032" 1034" 1036" 1038" 1040" 1042" 1044" 1046" 1048" 1050" 1052" 1054" 1056" 1058" 1060" 1062" 1064" 1066" 1068" 1070" 1072" 1074" 1076" 1078" 1080" 1082" 1084" 1086" 1088" 1090" 1092" 1094" 1096" 1098" 1100" 1102" 1104" 1106" 1108" 1110" 1112" 1114" 1116" 1118" 1120" 1122" 1124" 1126" 1128" 1130" 1132" 1134" 1136" 1138" 1140" 1142" 1144" 1146" 1148" 1150" 1152" 1154" 1156" 1158" 1160" 1162" 1164" 1166" 1168" 1170" 1172" 1174" 1176" 1178" 1180" 1182" 1184" 1186" 1188" 1190" 1192" 1194" 1196" 1198" 1200" 1202" 1204" 1206" 1208" 1210" 1212" 1214" 1216" 1218" 1220" 1222" 1224" 1226" 1228" 1230" 1232" 1234" 1236" 1238" 1240" 1242" 1244" 1246" 1248" 1250" 1252" 1254" 1256" 1258" 1260" 1262" 1264" 1266" 1268" 1270" 1272" 1274" 1276" 1278" 1280" 1282" 1284" 1286" 1288" 1290" 1292" 1294" 1296" 1298" 1300" 1302" 1304" 1306" 1308" 1310" 1312" 1314" 1316" 1318" 1320" 1322" 1324" 1326" 1328" 1330" 1332" 1334" 1336" 1338" 1340" 1342" 1344" 1346" 1348" 1350" 1352" 1354" 1356" 1358" 1360" 1362" 1364" 1366" 1368" 1370" 1372" 1374" 1376" 1378" 1380" 1382" 1384" 1386" 1388" 1390" 1392" 1394" 1396" 1398" 1400" 1402" 1404" 1406" 1408" 1410" 1412" 1414" 1416" 1418" 1420" 1422" 1424" 1426" 1428" 1430" 1432" 1434" 1436" 1438" 1440" 1442" 1444" 1446" 1448" 1450" 1452" 1454" 1456" 1458" 1460" 1462" 1464" 1466" 1468" 1470" 1472" 1474" 1476" 1478" 1480" 1482" 1484" 1486" 1488" 1490" 1492" 1494" 1496" 1498" 1500" 1502" 1504" 1506" 1508" 1510" 1512" 1514" 1516" 1518" 1520" 1522" 1524" 1526" 1528" 1530" 1532" 1534" 1536" 1538" 1540" 1542" 1544" 1546" 1548" 1550" 1552" 1554" 1556" 1558" 1560" 1562" 1564" 1566" 1568" 1570" 1572" 1574" 1576" 1578" 1580" 1582" 1584" 1586" 1588" 1590" 1592" 1594" 1596" 1598" 1600" 1602" 1604" 1606" 1608" 1610" 1612" 1614" 1616" 1618" 1620" 1622" 1624" 1626" 1628" 1630" 1632" 1634" 1636" 1638" 1640" 1642" 1644" 1646" 1648" 1650" 1652" 1654" 1656" 1658" 1660" 1662" 1664" 1666" 1668" 1670" 1672" 1674" 1676" 1678" 1680" 1682" 1684" 1686" 1688" 1690" 1692" 1694" 1696" 1698" 1700" 1702" 1704" 1706" 1708" 1710" 1712" 1714" 1716" 1718" 1720" 1722" 1724" 1726" 1728" 1730" 1732" 1734" 1736" 1738" 1740" 1742" 1744" 1746" 1748" 1750" 1752" 1754" 1756" 1758" 1760" 1762" 1764" 1766" 1768" 1770" 1772" 1774" 1776" 1778" 1780" 1782" 1784" 1786" 1788" 1790" 1792" 1794" 1796" 1798" 1800" 1802" 1804" 1806" 1808" 1810" 1812" 1814" 1816" 1818" 1820" 1822" 1824" 1826" 1828" 1830" 1832" 1834" 1836" 1838" 1840" 1842" 1844" 1846" 1848" 1850" 1852" 1854" 1856" 1858" 1860" 1862" 1864" 1866" 1868" 1870" 1872" 1874" 1876" 1878" 1880" 1882" 1884" 1886" 1888" 1890" 1892" 1894" 1896" 1898" 1900" 1902" 1904" 1906" 1908" 1910" 1912" 1914" 1916" 1918" 1920" 1922" 1924" 1926" 1928" 1930" 1932" 1934" 1936" 1938" 1940" 1942" 1944" 1946" 1948" 1950" 1952" 1954" 1956" 1958" 1960" 1962" 1964" 1966" 1968" 1970" 1972" 1974" 1976" 1978" 1980" 1982" 1984" 1986" 1988" 1990" 1992" 1994" 1996" 1998" 2000" 2002" 2004" 2006" 2008" 2010" 2012" 2014" 2016" 2018" 2020" 2022" 2024" 2026" 2028" 2030" 2032" 2034" 2036" 2038" 2040" 2042" 2044" 2046" 2048" 2050" 2052" 2054" 2056" 2058" 2060" 2062" 2064" 2066" 2068" 2070" 2072" 2074" 2076" 2078" 2080" 2082" 2084" 2086" 2088" 2090" 2092" 2094" 2096" 2098" 2100" 2102" 2104" 2106" 2108" 2110" 2112" 2114" 2116" 2118" 2120" 2122" 2124" 2126" 2128" 2130" 2132" 2134" 2136" 2138" 2140" 2142" 2144" 2146" 2148" 2150" 2152" 2154" 2156" 2158" 2160" 2162" 2164" 2166" 2168" 2170" 2172" 2174" 2176" 2178" 2180" 2182" 2184" 2186" 2188" 2190" 2192" 2194" 2196" 2198" 2200" 2202" 2204" 2206" 2208" 2210" 2212" 2214" 2216" 2218" 2220" 2222" 2224" 2226" 2228" 2230" 2232" 2234" 2236" 2238" 2240" 2242" 2244" 2246" 2248" 2250" 2252" 2254" 2256" 2258" 2260" 2262" 2264" 2266" 2268" 2270" 2272" 2274" 2276" 2278" 2280" 2282" 2284" 2286" 2288" 2290" 2292" 2294" 2296" 2298" 2300" 2302" 2304" 2306" 2308" 2310" 2312" 2314" 2316" 2318" 2320" 2322" 2324" 2326" 2328" 2330" 2332" 2334" 2336" 2338" 2340" 2342" 2344" 2346" 2348" 2350" 2352" 2354" 2356" 2358" 2360" 2362" 2364" 2366" 2368" 2370" 2372" 2374" 2376" 2378" 2380" 2382" 2384" 2386" 2388" 2390" 2392" 2394" 2396" 2398" 2400" 2402" 2404" 2406" 2408" 2410" 2412" 2414" 2416" 2418" 2420" 2422" 2424" 2426" 2428" 2430" 2432" 2434" 2436" 2438" 2440" 2442" 2444" 2446" 2448" 2450" 2452" 2454" 2456" 2458" 2460" 2462" 2464" 2466" 2468" 2470" 2472" 2474" 2476" 2478" 2480" 2482" 2484" 2486" 2488" 2490" 2492" 2494" 2496" 2498" 2500" 2502" 2504" 2506" 2508" 2510" 2512" 2514" 2516" 2518" 2520" 2522" 2524" 2526" 2528" 2530" 2532" 2534" 2536" 2538" 2540" 2542" 2544" 2546" 2548" 2550" 2552" 2554" 2556" 2558" 2560" 2562" 2564" 2566" 2568" 2570" 2572" 2574" 2576" 2578" 2580" 2582" 2584" 2586" 2588" 2590" 2592" 2594" 2596" 2598" 2600" 2602" 2604" 2606" 2608" 2610" 2612" 2614" 2616" 2618" 2620" 2622" 2624" 2626" 2628" 2630" 2632" 2634" 2636" 2638" 2640" 2642" 2644" 2646" 2648" 2650" 2652" 2654" 2656" 2658" 2660" 2662" 2664" 2666" 2668" 2670" 2672" 2674" 2676" 2678" 2680" 2682" 2684" 2686" 2688" 2690" 2692" 2694" 2696" 2698" 2700" 2702" 2704" 2706" 2708" 2710" 2712" 2714" 2716" 2718" 2720" 2722" 2724" 2726" 2728" 2730" 2732" 2734" 2736" 2738" 2740" 2742" 2744" 2746" 2748" 2750" 2752" 2754" 2756" 2758" 2760" 2762" 2764" 2766" 2768" 2770" 2772" 2774" 2776" 2778" 2780" 2782" 2784" 2786" 2788" 2790" 2792" 2794" 2796" 2798" 2800" 2802" 2804" 2806" 2808" 2810" 2812" 2814" 2816" 2818" 2820" 2822" 2824" 2826" 2828" 2830" 2832" 2834" 2836" 2838" 2840" 2842" 2844" 2846" 2848" 2850" 2852" 2854" 2856" 2858" 2860" 2862" 2864" 2866" 2868" 2870" 2872" 2874" 2876" 2878" 2880" 2882" 2884" 2886" 2888" 2890" 2892" 2894" 2896" 2898" 2900" 2902" 2904" 2906" 2908" 2910" 2912" 2914" 2916" 2918" 2920" 2922" 2924" 2926" 2928" 2930" 2932" 2934" 2936" 2938" 2940" 2942" 2944" 2946" 2948" 2950" 2952" 2954" 2956" 2958" 2960" 2962" 2964" 2966" 2968" 2970" 2972" 2974" 2976" 2978" 2980" 2982" 2984" 2986" 2988" 2990" 2992" 2994" 2996" 2998" 3000" 3002" 3004" 3006" 3008" 3010" 3012" 3014" 3016" 3018" 3020" 3022" 3024" 3026" 3028" 3030" 3032" 3034" 3036" 3038" 3040" 3042" 3044" 3046" 3048" 3050" 3052" 3054" 3056" 3058" 3060" 3062" 3064" 3066" 3068" 3070" 3072" 3074" 3076" 3078" 3080" 3082" 3084" 3086" 3088" 3090" 3092" 3094" 3096" 3098" 3100" 3102" 3104" 3106" 3108" 3110" 3112" 3114" 3116" 3118" 3120" 3122" 3124" 3126" 3128" 3130" 3132" 3134" 3136" 3138" 3140" 3142" 3144" 3146" 3148" 3150" 3152" 3154" 3156" 3158" 3160" 3162" 3164" 3166" 3168" 3170" 3172" 3174" 3176" 3178" 3180" 3182" 3184" 3186" 3188" 3190" 3192" 3194" 3196" 3198" 3200" 3202" 3204" 3206" 3208" 3210" 3212" 3214" 3216" 3218" 3220" 3222" 3224" 3226" 3228" 3230" 3232" 3234" 3236" 3238" 3240" 3242" 3244" 3246" 3248" 3250" 3252" 3254" 3256"



automatic roller fire doors at new Central Technical School. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall.

**Toronto, Ont.**—Tenders will be received by the Board of Education until Friday, Nov. 26, 1915, for ventilating fans, iron fence, ash hoist, local telephones, bronze tablets, steam fittings, etc. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall.

**Halifax, N.S.**—Tenders will be received by the Governor of the Province of Macao, up till January 8, 1916, for the supply of a steel, self-propelling dredge for the use of the Macao Harbor Works. Full particulars may be obtained at the office of Fred. H. Oxley, Consul for Portugal, Keith Bldg., Halifax, N.S.

**Toronto, Ont.**—Tenders will be received by the Chairman, Board of Control, City Hall, up to Tuesday, December 7, 1915, for the supply and erection of a mechanical mixing apparatus for the high-level chlorination plant, Wilton avenue and Don River; also the supply and erection of a mechanical mixing apparatus for the low-level chlorination plant, Eastern avenue and Don River. Specifications and forms of tender may be obtained at the Works Department, Room 6, City Hall.

## Building Notes

**Sarnia, Ont.**—A new public school building will be built at an estimated cost of \$50,000.

**Montreal, Que.**—The D. H. Hogg Co. will build a factory to cost \$5,000. A building permit has been obtained.

**Montreal, Que.**—A building permit has been issued to the City Ice Co., who propose building a plant at a cost of \$2,500.

**Toronto, Ont.**—The foundations have been completed for the new offices for the Board of Education. The building will cost \$100,000.

**Vancouver, B.C.**—A Union Station for the Great Northern and Northern Pacific Railways will be built on a site purchased on False Creek. Fred. L. Townley, of Vancouver, is the architect.

**Toronto, Ont.**—The Board of Education have obtained a permit to erect the new Park School, costing \$186,000. The plans call for the erection of a three-storey brick building at 126 Sydenham street.

## Contracts Awarded

**Toronto, Ont.**—The contract for building the new incinerator has been awarded to E. H. Thomas of this city at \$84,500.

**Hespeler, Ont.**—Grill Bros. have been awarded the contract for the waterworks pumping station and will start work at once.

**Woodstock, Ont.**—The contract for the new steel bridge over Thames street has been awarded to the Hamilton Bridge Co., Hamilton, Ont., for \$3,190.

**Berlin, Ont.**—The Canadian Allis-Chalmers, Ltd., Toronto, have been awarded the contract for the pumps for the new sewage disposal plant. The amount of the tender was \$4,492.

## Personal

**Col. Frederic Nicholls**, president of the Dominion Steel Corporation, has arrived in London on a visit to the Old Country.

**Colin C. Campbell**, senior member of the firm of R. Campbell & Sons, pottery manufacturers of Hamilton, Ont., died on Nov. 15, aged 53 years.

**Alfred W. Smithers**, chairman of the English Board of the Grand Trunk Pacific Railway, who has been spending several weeks in Ottawa and Montreal, sails this week for England.

## Trade Gossip

The Munitions Committee has ruled that the price of steel for ammunition to be made in Canada shall not exceed  $3\frac{1}{2}$  cents a pound.

The Canada Cement Co., Montreal, which recently received a large order for the manufacture of shells, will install an electric furnace for the purpose of making the steel required.

**Cobourg, Ont.**—The machinery in the old Provincial Steel Co.'s plant here has been purchased by the A. R. Williams Machinery Co., of Toronto, and will be shipped to Victoria, B.C.

**Calgary, Alta.**—The Calgary Iron Works has received an order for an additional 5,000 shells. The Buckeye Machinery Co. is about to get another contract. The latter company may get an order for 50,000 shells.

**South Porcupine, Ont.**—By changing the gold extraction system from the old amalgamation process to cyanide it is expected a greater recovery will be made

# PETRIE'S WEEKLY LIST

Of New and Used Machine  
Tools in Stock for  
Immediate Delivery

## Turret Lathes and Screw Machines

40" x 12' New Haven  
26" x 8' Davis  
20" x 10' American  
20" x 6' Bridgeport  
18" x 6' Dress  
16" x 5' Jones & Lamson  
15" x 5' B. N. American  
15" x 5' Bardons & Oliver  
No. 3 Pratt & Whitney  
No. 1 Pratt & Whitney  
3" Cleveland automatic  
3" Cleveland automatic  
8" x 31" Brown & Sharpe  
6" x 28" Brown & Sharpe (3)  
Foster ring turret  
Garvin double turret

## Engine Lathes

42" x 20' Finfield  
36" x 16' Finfield  
42" x 14' Bradford  
32" x 20' Bradford  
30" x 15' Putnam  
30" x 10 1/2' Pond  
26" x 14' Gleason (3)  
24" x 21' Finfield  
24" x 14' Putnam  
24" x 12' Niles  
24" x 10' Bradford  
24" x 8' Fay & Scott  
24" x 8' Fitchburg (3)  
20" x 10' Powell  
20" x 8' Bullard  
18" x 8' Bradford  
18" x 8' Fitchburg  
18" x 6' Lodge & Davis  
17" x 8' Blaisdell  
16" x 6' LeBlond  
15" x 5' Plarber

## Upright Drills

20" Bickford (3)  
20" Baker (heavy duty)  
20" Buffalo (4)  
20" Bestram (2)  
20" Bickford  
20" Barnes  
8 1/2" Bestram universal radial  
7 1/2" Bestram universal radial  
5 1/2" Stevens plain radial

## Planers and Shapers

52" x 50" x 11' Pond  
30" x 30" x 15' Wheeler  
30" x 30" x 16' Putnam (2 heads)  
30" x 50" x 8' Bestram  
25" x 25" x 12' Lodge & Davis  
15" x 18" Cincinnati (pet. side)  
10" x 24" Fitchburg traverse  
9" Smith & Mills  
24" Hendey  
20" Baker  
16" Garvin

## Milling Machines

No. 4 Brown & Sharpe universal  
No. 12 Brown & Sharpe plain table  
No. 3 Cincinnati plain

## Presses

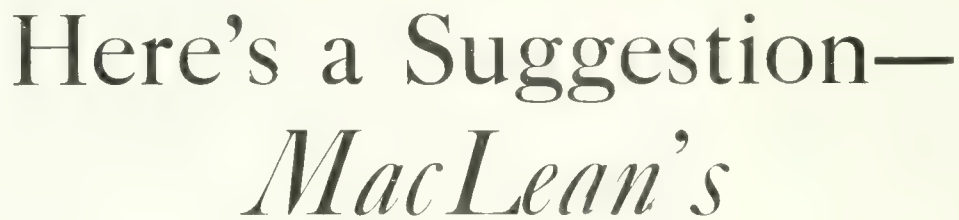
No. 300 Brown Bagg  
No. 100 Bliss  
No. 5 Wagoner  
No. 1 S. P. Co.  
No. 2 P. Co.

## Miscellaneous

36" Fellows gear shaper  
14-26 Besly grinder  
Bath metal grinder  
No. 1 Low 21" S. P. Co. mill  
12" Bestram shaper  
11 1/2" Bestram shaper  
11 1/2" Standard lathe

Prices, Descriptions and Full  
Particulars on Request

**H. W. PETRIE, LTD.**  
Front St. W. - Toronto, Ont.



**MacLean Publishing Co., Limited**  
143-153 University Avenue, Toronto, Ontario



at the Dome Lake mill. The cyanide equipment is now being added.

**Amherst, N.S.**—The buildings, plant and machinery of the Hewson Pate Wool Textiles Co. was sold on Nov. 17 to E. F. Stevens of Halifax, N.S., representing the bond holders, for \$102,000. The concern will be reorganized.

**The Pine River Light and Power Co.** power house, transmission lines, etc., within the corporation limits of Shelburne, N.S., will pass into the possession of the town December 1, the necessary deal having been closed last week. The town will pay \$4,360 for the outfit.

**Gold Medal for G. T. R.**—The Grand Trunk system has been awarded the gold medal (highest award) and diploma for its exhibit at the Panama-Pacific International Exposition at San Francisco. The exhibit formed scenic, agricultural and industrial resources of Canada.

**Vancouver, B.C.**—Applications for all the forty acres of the False Creek foreshore which is being filled in under the direction of the Board of Harbor Commissioners, have been received, according to the members of the board. Among those who desire to lease sites are a number of local firms, but a number of outside companies desire to establish industries here.

**Marshall-Weden Machine Gun.**—William Marshall, consulting engineer of Toronto, one of the inventors of the Marshall-Weden machine gun, has sold to the St. Louis Car Co. the right to manufacture the gun in all countries of the world except Canada. It is stated that he will receive about \$30,000,000 in commissions on a large order from the French and Russian governments.

**Demand for Old Rails.**—The inability of the mills of the Pittsburgh district to accept orders for steel rails for quick delivery has resulted in numerous enquiries from foreign governments for second-hand rails. It was learned last Friday that agents for Italy, Switzerland and the Belgian Congo are trying to place orders in Pittsburgh for 50,000 tons of old rails, to be used chiefly for repair work on Continental railroad lines.

**Empire Reconstruction.**—Lord Rosebery, speaking on Empire reconstruction, said that Imperial sentiment in Canada and Australia was at one time a pale shadow of what it is now. The blood which the Dominions have shed in our behalf must in consequence change the the Empire's constitution. He could not doubt that when the efforts of the Peace Congress were over there will appear a gigantic task of reorganization of the British Empire. "We should have to clean the whole of our slate before writ-

ing the new organization of the Empire," he said.

The Dominion Steel Corporation is devoting particular attention to the production of shell steel, which is in such active demand, and is leaving the turning out of shells to the other companies. The management went into the matter of shell output with the old shell committee, but did not see its way clear to take on the heavy capital outlay incident to taking on shell production as well. It is stated in steel circles that further foreign orders, particularly Russian, are now available, if the Canadian mills can give any guarantee of being able to make deliveries as required.

**Dominion Industries Will Be Mobilized.** The Economic and Development Commission is receiving suggestions from leading organizations interested in agriculture, stock raising, fruit growing, marketing transportation, immigration and other matters affecting the progress of Canada. Questions requiring the consideration of technical experts will be dealt with by proper special committees of inquiry. It is the aim of the commission to proceed as rapidly as possible toward assisting in the mobilization of the agricultural and industrial resources so that Canada may be in the best possible position to meet after-war conditions.

**Guelph, Ont.**—Chief Engineer Gaby of the Hydro-Electric, with his staff, has been in the city recently in consultation with the City Council. The members of council went over the routes proposed by the Hydro engineers and others that had been suggested by the city engineer. The route favored by the city engineer would cost, Mr. Gaby stated, \$150,000 more than the one drawn by the Hydro engineers in the first place. At the final meeting of council a resolution was put through favoring the original plans submitted by the Hydro engineers. This means that the original plans, on which Guelph's share was placed at \$700,000, will be submitted to the ratepayers at the January elections.

**Steel for U.S. Battleships.**—Congress may be asked to place a temporary embargo on exports of structural steel to the European belligerents in order to afford a sufficient supply of the metal for use in the construction of the two battleships, bids for which were opened at the Navy Department last week. This plan is suggested as a result of the disclosure that neither of the new battleships can be laid down before next summer because of a lack of steel. The entire output of the American steel plants, it is said, has been taken by the warring nations. Secretary of the Navy Daniels, who is deeply concerned over the fact, has said that unless steel plants can be

## Special Machinery MADE TO ORDER

Mill Machinery, Engine Work  
Grey Iron and Brass Castings

TRY US FOR GENERAL REPAIRS

**ALEXANDER FLECK, LIMITED**

(Vulcan Iron Works)

OTTAWA, ONT.



Will  
Give You  
Exceptional

## Shell Forging Production

WITHOUT AN EQUAL FOR  
BOTH FIRST AND  
SECOND OPERATION  
PUNCHES.

Comes to you heat treated  
and ready for use.

It does not stick to the  
work.

There are many cases where  
each punch has turned out  
over 2,000 shells.

It means more shells, per  
machine per day.

STEEL OF EVERY  
DESCRIPTION.

**Hawkrige Brothers  
Company**

303 Congress St., BOSTON, MASS

## CLASSIFIED ADVERTISEMENTS

STEAM ENGINES FOR SALE. ONE 10 H.P. stationary engine and settings complete; good working order. Price one hundred dollars. One 31 H.P. upright, good working order. Price fifty dollars. Apply to H. A. Lawrence, West Shore Rd., Quebec.

### FOR SALE

SALESMAN WANTED. ESTABLISHED house selling metals, machinery and supplies desires an experienced man to take charge of this line. Box 758, Canadian Machinery.

FOR SALE—RICHARDS INDICATOR, complete, with attachments, nearly new, in perfect order. Apply Canadian Machinery, 115 University Ave., Toronto.

## FOR SALE

**16 Engine Lathes  
18-in. to 42-in. Swing**

**American Machinery Exchange**  
217 Centre St., New York City

## Machinery For Sale

- 1 Automatic Gridley, 1½ capacity.
- 1 16" shaper with countershaft and swivel vise.
- 1 New 4-spindle "Good Prentiss" Ball-Bearing Drill Press.
- 1 16" x 8" Davis Single Gear Engine Lathe.
- 1 15 x 5 Flatner Tool Room Lathe.
- 2 Fox Lathes, 1½ and 1½ capacity.
- 1 18" Bardon & Oliver Turret Lathe, power feed, back geared.
- 4—Electric Direct Current Breast Drills, up to ¾ capacity.
- 1—3-Ton Screw Pulley Chain Block.
- 4 5-Ton Screw Pulley Chain Blocks.
- 2 4-Ton Screw Pulley Chain Blocks.

**Ontario Metal Products Co.  
Limited**

102 FRONT ST. EAST, TORONTO

## For Sale

Second-Hand Steel Tiering Machine, operated by hand.

By the use of this machine one man may lift as high as the ceiling, if necessary, heavy boxes, bales, rolls, etc.

This machine is in first-class condition, and is offered at a sacrifice.

Box 157

**Canadian Machinery**

duced to insure preference for Government orders Congress may be urged to act.

**Imported Shell Forgings.** A duty of 32½ per cent. is imposed on shell forgings entering Canada from the United States. Up to the present it has been deemed wise by the Canadian Government not to remove the tariff, as some twelve Canadian companies have been turning out forgings at a rate sufficient to supply the needs of other manufacturers who merely finish shells. Since the recent further distribution of shell orders by the Munitions Committee at Ottawa it is, however considered advisable in some quarters to have the duty removed, on the ground that the output of shells in Canada would be increased by the importation of forgings from the United States. It is announced from Ottawa that the Munitions Committee has fixed the price of steel for ammunition to be made in Canada. It must not exceed 3½¢ per pound.

**After the war what?** We cannot go back to the status quo ante. Class jealousy is breaking down in the trenches. Two million soldiers will come back appreciating the meaning of the phrase "an officer and a gentleman;" 50,000 officers one and all saying that the men are splendid. . . . I believe that it is good business to treat the workman well, to welcome him as a partner—a junior partner who is bound to take a more prominent share in the management and the profits of the concern in the near future. Good business or not, it is the clear duty of every employer to-day. We have had enough of the workman striking against the master in South Wales, of the master hailing the workman before munition tribunals on Tyne and Clyde, while the brothers of each are dying side by side in Flanders and Gallipoli.—Chairman of a Controlled Establishment.

**The Willys-Overland, Ltd.,** has recently been incorporated with a capital of \$6,000,000, and with head office in Toronto. The new company will take over the complete motor business of the Russell Motor Car Co., Ltd., and the complete Canadian business of the Willys-Overland Co. The intention is not merely to assemble, but to provide for the complete manufacture at the West Toronto plant of the Overland and Knight motor cars. John N. Willys, head of the Willys-Overland Co., of Toledo, will become president of the new company, and T. A. Russell, present vice-president of the Russell Motor Car Co., will be vice-president. Lloyd Harris will also be a member of the board, and there will be other Canadian directors. It is understood that under the new arrangement the Russell Motor Car Co. will continue

## Rumely-Wachs Machinery Co.

121 N. JEFFERSON ST.

CHICAGO

ILLINOIS

A Few of Our Second-Hand Tools in Stock for Immediate Delivery:

### Automatic Screw Machines

Brown & Sharpe No. 2, 7½ inch (2)  
National Acme No. 53, 4-spindle, 1 inch.  
Pratt & Whitney, 1 inch.  
Hartford, 1 inch.  
Cleveland ¾ inch, friction disc feed (5)  
Cleveland ¾ inch, plain (2)  
Cleveland ¾ inch, plain (15)  
Cleveland 2 inch friction jigger.  
Wells ¾ inch.

### Lathes

12" x 5' Fairbanks.  
14" x 6' Silk.  
16" x 6' LeBlond.  
20" x 10' Fifield  
25" x 12' Reed.

### Planers

30" x 24" x 8' Pease.  
30" x 30" x 8' Gray.  
24" x 24" x 6' Lodge & Davis.  
36" x 36" x 8' Fitchburg.  
36" x 35" x 15' Woodward & Powell.

### Presses

Bliss No. 18 o.b.i. (10)  
Bliss No. 42 o.b.i. (3)  
Rockford No. 2 o.b.i.  
American Can No. 3 o.b.i.  
American Can No. 4 o.b.i.  
American No. 4½ o.b.i.  
Wold No. 12 open back (5)  
Crosby No. 40 open back (4)  
Crosby No. 18 o.b.i.  
Crosby No. 19 o.b.i. (4)  
Crosby No. 119 o.b.i.  
Crosby No. 1 o.b.i. (4)  
Bliss No. 69-N Double Acting  
Adrianne No. 12-A Double-Acting  
George A. Ohl 3' Press or Brake  
Stiles No. 3 Solid Back (2)

### Milling Machines

Brown & Sharpe No. 4 Universal  
Brown & Sharpe No. 12 Lincoln (5)  
Brainard No. 7 Lincoln  
Newton No. 4 Plain  
Fox No. 3, Hand and Power  
Brown & Sharpe No. 11 Lincoln (2)  
Warner & Swasey No. 2 Disc Sinker

### Shapers

16" Stockbridge, crank  
15" Hendey Tool Room  
20" Smith & Mills, b.g.  
21" Averbeck, b.g.  
20" Gould & Eberhardt, b.g.

### Drill Presses

20" Square Base W & L feed (10)  
20" Wheel, lever and power feed (5)  
20" Wheel, lever and power feed, b.g. (4)  
21" Stationary Head, complete (2)  
24" Sliding Head, complete  
28" Sliding Head, complete  
31" Sliding Head, complete (2)  
Fosdick 4' Radical, Gear Box  
Prentice 5' Radial, Gear Box

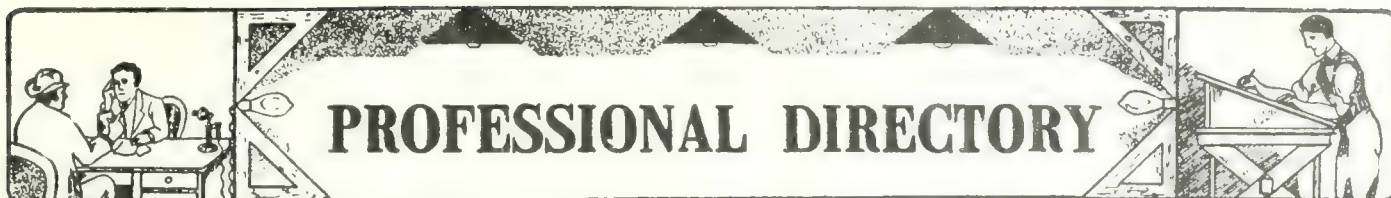
### Boring and Turning Mills

Betts 6' two swivel heads  
Barrett No. 5 Cylinder Boring Mill

### Miscellaneous

Large stock Keyseaters, Bolt Cutters, Centering Machines, Wire Straighteners, etc.  
Resty 26 18" 2-spindle Grinder with ring wheel chucks.





**ROSS THOMSON & CO.**

**PATENTS**

OTTAWA CAN. WASHINGTON USA. LONDON Eng. PARIS FR.

SEND FOR FREE BOOK—PATENT PROTECTION—PERSONAL ATTENTION GIVEN ALL CASES AT PATENT OFFICE

**PATENTS**

**TRADE MARKS, DESIGNS AND COPYRIGHTS**

ALL COUNTRIES.

Specialists on Infringement Cases.

**H.J.S. DENNISON**

PATENT ATTORNEY AND EXPERT.

Star Building, 18 King St. West, TORONTO

**PATENTS PROMPTLY SECURED**

In all countries. Ask for our Inventor's Adviser, which will be sent free.

**MARION & MARION, 364 University St.**

Merchants Bank Building, corner St. Catherine St., MONTREAL. Phone Up. 6474 and Washington, D.C., U.S.A.

**PATENTS**

**W. T. Cuffe-Quin**

Patent Solicitor and Expert  
Registered Patent Attorney, U.S. 9187  
Fellow Surveyors' Institute, London, England

47 Central Chambers, Elgin Street, OTTAWA, CANADA. Near Govt. Patent Office.

Associate work for the Legal Profession before the Government  
Patent Office, a specialty  
Cable address: "Cquin Ottawa."

**PATENTS TRADEMARKS AND DESIGNS**

PROCURED IN ALL COUNTRIES

Special Attention given to Patent Litigation  
Pamphlet sent free on application.

**RIDOUT & MAYBEE** 59 Yonge Street  
TORONTO

**PATENTS**

**FETHERSTONHAUGH & CO.**

THE OLD ESTABLISHED FIRM  
5 ELGIN ST OTTAWA  
ROYAL BANK BLDG TORONTO

SEND FOR PLAIN PRACTICAL POINTERS  
COPY NATIONAL PROGRESS IN WHICH  
ALL OUR PATENTS ARE ADVERTISED

Think  
it  
Over

Write  
Us  
To-day



## Do Trade-Marks Pay? YES!

Get our new Booklet  
"Trade-Marks That Pay"

(Sent to Manufacturer free of charge)

This shows how Trade-Marks have paid for themselves and will give you some suggestions how it will pay you to have a Trade-Mark for your goods. Give your goods some mark for identification. So that the buyers will know and ask for your SPECIAL LINE OF GOODS. Trade-Marks pay for your goods by your Trade-Mark. Let us show you how it pays.

Write for Your Copy To-day.

**HAROLD C. SHIPMAN & CO.**  
PATENT ATTORNEYS

20 Elgin Street, Ottawa (Next door to Canadian Bank Bldg.)

SEND YOUR PATENT WORK DIRECT  
TO OTTAWA—SAVE TIME AND MONEY

\*Prompt and personal attention given to all matters placed in our hands

## High-Grade Malleable Castings

OF ALL SIZES AND KINDS

**Galt Malleable Iron Co., Limited - - Galt, Ontario**

If what you want is not advertised in this issue consult the Buyers' Directory at the back

# WIRE SPRINGS

OF ALL KINDS

Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies comparison. Follow our requirements. Send samples or specification for price.

**JAMES STEELE, LIMITED**  
GUELPH, ONTARIO

**JOHN STIRK & SONS, Limited**  
HALIFAX, ENG.

**MACHINE TOOLS**  
Agents—The A. R. Williams Mty. Co., Ltd.  
Toronto, Winnipeg, Vancouver, St. John, N.B.

**WM. MUIR & CO., Limited**  
Manchester, England.  
Machine Tool Makers.  
Specialties: Patent Puncher Slotting Machines, Milling Machines, Boring Machines.  
Agents: Messrs. Peacock Bros., 68 Beaver Hall Hill, Montreal.  
Send for catalogue.

## Sell Your Scrap Materials Direct to the Wholesaler

Get our quotations before selling. We are wholesale dealers in all grades of Scrap Iron, Scraped turnings and borings, Scrap Copper, Brass, etc. This week we are paying 20 cents per pound for Scrap Aluminum.

Send for our monthly price list. Our Motto, "Honest dealings and prompt settlements."

**L. S. Tarshis & Son**  
88-92 Wellington St., Montre

# MAPLE LEAF

## STITCHED COTTON DUCK

# BELTING

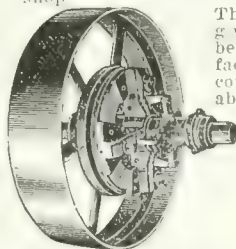
**DOMINION BELTING CO. LTD.**  
HAMILTON CANADA

## The "Frisbie" Clutch

### Guarantees Economy and Safety

Scrap that old fashioned clutch that means wasted power, loss of time and often serious accidents

The Frisbie Clutch gives you complete, instantaneous control of a machine, thus preventing many accidents, besides enabling you to shut down one machine without affecting any others in the shop.



The "Frisbie" will give longer service because the friction faces are specially constructed for durability.

Ask us for full particulars and you will be amply repaid.

**The Eastern Machinery Company**  
New Haven, Conn., U.S.A.

## BERTRAMS LIMITED

Engineers

Sciennes, EDINBURGH  
PAPER MILL MACHINERY

and  
MACHINE TOOLS for IRON WORKERS  
Catalogues offered to Purchasers.

# BOLTS

Our large stock of  
**Machine Bolts,**  
Rivets and Washers  
assures quickly filled orders and prompt shipment.  
One quality only—  
**The Best.**  
Send a trial order.

**LONDON BOLT & HINGE WORKS**  
London Ontario

# WANTED

## NEW INVENTIONS

Send for full list of inventions wanted by manufacturers. Get a copy of our new Booklet, "REFERENCE GUIDE FOR INVENTORS." It tells about how to obtain a patent, and every inventor should have a copy. If you have any inventions worked out, make a sketch and number the parts. Send it with a description of it in your own words, referring to the parts by numbers. Tell how it works, and state its advantages. If you send model be sure that it bears your name, so that we can tell by whom it is sent. Free Search of Patent Office Records. It may mean your fortune. \$45,000 paid for some inventions. \$10,000 offered for others. Write us at once. Send names of others you know to be interested in inventions.

**HAROLD C. SHIPMAN & CO.,** Registered Patent Attorneys  
193 Hope Bldg., Ottawa, Can.

its bicycle and munition departments as heretofore, but its motor car interest will now be represented by its holdings in the new Willys-Overland, Ltd.

## New Incorporations

The Hamilton Aero Mfg. Co. of Vancouver, B.C., has been incorporated with a capital of \$50,000.

The Great Western Direct Power Engine Co., of Vancouver, B.C., has been incorporated with a capital of \$25,000.

The Eclipse Iron Works, Ltd., Vancouver, B.C., has been incorporated with a capital stock of \$20,000 to manufacture iron, steel, machinery, etc.

The International Gas Co. has been incorporated at Ottawa with a capital of \$125,000. Incorporators: W. Bradley, T. A. Beament and A. H. Armstrong.

Atlantic Chemicals, Ltd., have been incorporated at Ottawa with a capital of \$50,000 to manufacture chemicals and drugs at Toronto. Incorporators: Frank Regan, John G. Holmes, of Toronto, Ont.

The Castings Co. of Canada, Ltd., has been incorporated with a capital of \$40,000. Head office at Montreal and works at Valleyfield, Que. Incorporators: H. Cohen, A. Ellison and S. G. Metcalfe, of Montreal.

The Canadian Lockers, Ltd., has been incorporated at Ottawa, with a capital of \$100,000, to manufacture lockers, vaults, etc., at Toronto, Ont. Incorporators—H. Riley, J. W. Bicknell and J. S. Duggan, all of Toronto.

The Reliable Oil Co. has been incorporated at Ottawa with a capital of \$40,000 to produce and refine oil and oil products at Montreal. Incorporators: Henry J. Trihey, Ernest Lafontaine and Michael T. Burke, all of Montreal.

Gres Falls Development Co. has been incorporated at Ottawa with a capital of \$10,000 to purchase and develop water powers. Head office at Montreal. Incorporators: Gordon W. MacDougall and Lawrence McFarlane, of Montreal.

The Cheney Waterworks Co. has been incorporated at Toronto, with a capital of \$1,500, to construct and operate a waterworks system at Cheney, Ont. Provisional directors—J. Limery, D. and A. Legault, of Cheney, Ont.

The Canadian Briscoe Motor Co., Ltd., has been incorporated at Ottawa with a capital of \$200,000 to manufacture motor cars and trucks. Head office at Brockville, Ont. Incorporators: T. J. Storry, A. O. Heather and H. L. McDowell, all of Brockville, Ont.

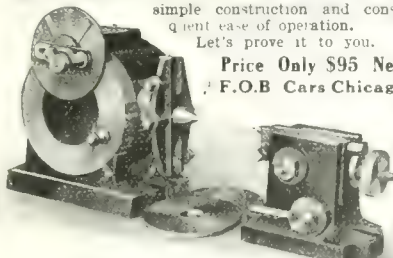


**Save \$40 to \$90 on First Cost****With Dickow's 10-Inch Universal Index Centers**

We are originators of design. You save from \$40 to \$90 on first cost, and many times that by their simple construction and consequent ease of operation.

Let's prove it to you.

Price Only \$95 Net,  
F.O.B. Cars Chicago



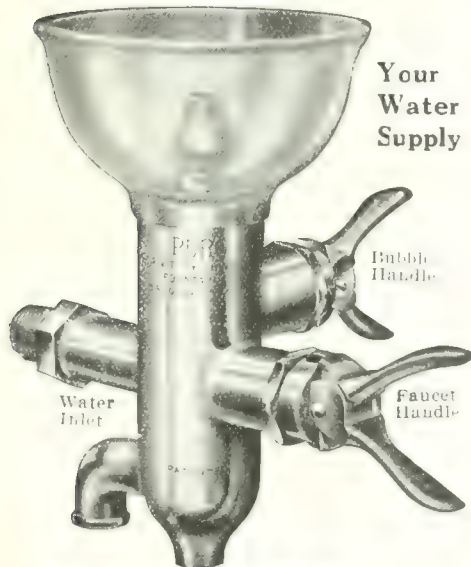
Get the Original—Accuracy Guaranteed  
Sold by all dealers. Write to-day for particulars

Fred. C. Dickow, 37 So. Desplaines St., Chic. 60, Ill., U.S.A.

**"PURO - FY"**

(MADE IN CANADA)

Your  
Water  
Supply



**T**HE American Museum of Safety conferred Gold Medal Award on the Puro Sanitary Drinking Fountain at the First International Exposition on Safety and Sanitation.

The Puro Sanitary Drinking Fountain was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

**Safe Simple  
SANITARY Economical  
Quickly Attached**

The Puro is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

It is the only drinking fountain that was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

It is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

It is the only drinking fountain that was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

It is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

It is the only drinking fountain that was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

It is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

It is the only drinking fountain that was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

It is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

It is the only drinking fountain that was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

It is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

It is the only drinking fountain that was chosen as the best of its kind by the judges that made it stand head and shoulders above any other drinking apparatus.

It is the only drinking fountain that meets all the requirements of the National Sanitation Conference. It is the only drinking fountain that meets all these qualifications; and Puro was not tied for first place; Puro was first.

The Canadian Crow Motor Co. has been incorporated at Toronto, with a capital of \$100,000, to manufacture motor cars at Mount Brydges, Ont. Provisional directors are J. K. Kidd, Edward R. Bond and G. Lowthian.

The Brandon Shell Co. has been incorporated at Toronto, with a capital of \$100,000, to manufacture munitions at Toronto, Ont. Incorporators—Harold W. Shapley, William B. Milliken, and Gordon McLaughlin, all of Toronto.

The Arena of London, Ltd., has been incorporated at Toronto, with a capital of \$40,000, to operate an arena and manufacture ice at London, Ont. Provisional directors—W. I. Spettigue, F. B. Ashplant and E. B. Graham, all of London.

The Ideal Foundry & Hardware Co. has been incorporated at Toronto, with a capital of \$50,000, to take over as a going concern the Imperial Foundry Co. of Toronto. Provisional directors—A. E. Furniss, R. M. Yeomans and B. MacDonald.

The Salt Development Co. of Canada, Ltd., has been incorporated at Ottawa with a capital of \$35,000 to develop and manufacture salt and salt products. Head office at Montreal. Incorporators: Louis A. David, Louis E. A. Mailhot and Segfried H. R. Basc, all of Montreal.

**Catalogues**

**Sand Mixers.**—The Sand Mixing Machine Co., New York, have issued a booklet containing reproductions of 30 advertisements from customers who have purchased their auto sand cutter. In addition to the above, the machine is fully described and illustrated.

**"Lagonda" Valves.**—The latest publication, N-3, issued by the Lagonda Mfg. Co., of Springfield, Ohio, is a 24-page bulletin on their triple-acting automatic cut-off valves and non-return valves. This book briefly, but completely, discusses the function of these valves, and illustrates the several types made by the Lagonda Mfg. Co., which are the standard angle type and straight way valve, the low squat body valve for low head room, and the horizontal valve. A copy of this bulletin will be sent to any one on request.

**CUNNINGHAM & SON**  
ST. CATHARINES, ONT.

MILL MACHINERY	MACHINERY	SPECIAL MACHINERY
MARINE ENGINES	REPAIRS	MADE TO ORDER

**CASTINGS**  
OF EVERY DESCRIPTION.

**WOOD METAL**  
**PATTERNS**  
"GUELPH"  
PATTERN WORKS  
135 Woolwich St. Guelph, Ont.

**WOOD AND METAL**  
**PATTERNS**

We also make  
Mounted Match Plates, Cast Iron  
Match Plates and Gates

Our staff of skilled workmen and our excellent facilities assure good quality and prompt delivery.

Write  
**HAMILTON PATTERN & FOUNDRY CO.**  
HAMILTON, ONT.

**CASTINGS**  
in BRASS  
ALUMINUM  
BRONZE  
and  
COPPER

**MORTON MANUFACTURING CO.**  
PORTABLE PLANERS  
DRAW CUT SHAPERS  
SPECIAL DRAW CUT R R SHAPERS  
FINISHED MACHINE KEYS  
STATIONARY & PORTABLE KEY WAY CUTTERS  
SPECIAL LOCOMOTIVE CYLINDER PLANERS  
OFFICE: WORKS: MUSKOGEE HEIGHTS, U.S.A.

**Oil Tempered  
Steel Springs**

—for every purpose and the best for each use.

Special styles of all kinds to order.

**THE CLEVELAND  
WIRE SPRING  
COMPANY**  
Cleveland, Ohio

**THE OWEN SOUND IRON WORKS CO.**  
Owen Sound, Ont.

**Engineers**  
**Boiler-makers**  
**Founders**  
**Machinists**

Tank Work,  
Smoke Stacks,  
Grey Iron and  
Brass Castings,  
Special  
Machinery  
Made to  
Order.

**PURO** **SANITARY  
DRINKING  
FOUNTAIN CO**

TRADE MARK  
147 University Ave.

TORONTO, ONT.

# IMMEDIATE DELIVERY

WE CALL ATTENTION TO THE FOLLOWING TOOLS, ALL OF WHICH ARE IN THOROUGHLY FIRST CLASS CONDITION READY FOR IMMEDIATE SERVICE WITH NET PRICES ATTACHED.

## SCREW MACHINES.

80 Cleveland Automatic Screw Machines, with 3/8" spindle capacity. These machines are of 1909 model. Price \$8250.00 each, F.O.B. shipping point.

## TURRET LATHES.

One Jones & Lamson 2 x 24 flat turret with bar equipment, core driven, condition first class. Price .....	\$750.00
One Garvin No. 3 turret lathe, 18" swing, with 2 1/2" hole through spindle, back geared and friction head. Price .....	\$450.00
One Garvin No. 2 1/2 turret lathe, 16" swing, 1 1/2" hole through spindle, back geared and friction head. Price .....	\$400.00
One American Tool Works Co. turret lathe, 18" swing with 3" hole through spindle, equipped with back gear, friction head. Price ..	\$700.00
One Pratt & Whitney No. 3 turret lathe, 14" swing, 1 1/4" hole through spindle, back geared and friction head. Price .....	\$390.00
One No. 3 Pratt & Whitney screw machine, 14" swing, 1" hole through spindle, with wire feed attachment, plain head. Price .....	\$325.00
One Davis & Egan No. 3 screw machine, 12" swing with 1" hole through spindle, complete with wire feed, plain head. Price .....	\$275.00
One Garvin wire feed screw machine, 12" swing with 1" wire feed capacity, plain head. Price .....	\$270.00
One Warner & Swasey plain head turret lathe, 14" swing with 1" spindle capacity. Price .....	\$225.00
One Windsor plain head turret lathe, 14" swing with 1" spindle capacity. Price .....	\$225.00
One 16" x 50" Gage Fox Monitor brass turning lathe, back gears. Price .....	\$300.00

**Girard Machine and Tool Co.**

491-493 N. Third Street, Philadelphia, Pa.

## FOR SALE

Eight Cleveland Automatic Screw Machines, with 3/8" spindle capacity, 1909 model. First-class condition.

**GIRARD MACHINE & TOOL COMPANY**

491-493 N. Third St., Philadelphia, Pa.

## B. & C. Combination Wrench



Does both  
**PIPE**  
and  
**NUT**  
Work

It is especially useful on general work, as it obviates employing two wrenches. For general utility and all round convenience it has no equal.

Quality that stands up to long, severe service.

Head, Bar and Shank One-Piece Steel Forging. Made from the best of materials. Parts interchangeable.

Write for our complete catalogue of wrenches.

**Bemis & Call  
Hardware & Tool Co.**

Springfield, Mass., U.S.A.

## METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

**W.H. BANFIELD & SONS**

372 Pape Avenue Toronto

## For Steel Castings

Low Phosphorus Pig Iron

Ferro-Manganese

Spiegeleisen.

50% Ferro-Silicon

10% Ferro-Silicon

Ferro-Vanadium

From stock and for import

**A. C. LESLIE & CO.**

LIMITED  
MONTREAL

The advertiser would like to know where you saw his advertisement—tell him.



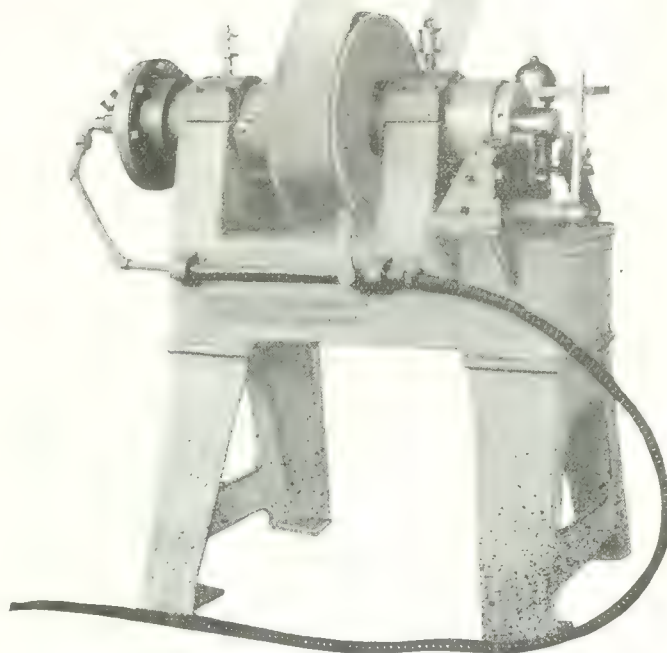
# Single Purpose Lathes for Shell Work

The Lathe as shown is equipped with air chuck and friction, and tooled for the Russian High Explosive Shell.

We can make quick delivery on these single purpose lathes for band turning operation on British sizes, 18 Pr., 4.5, 5", 6", 8", 9.2". These machines are also tooled when required for the M/M sizes corresponding for Russian and French ammunition. The machine as illustrated will truly and accurately finish 50 to 60 bands per hour. For particulars write

**The Jenckes Machine Co., Limited**  
 Sherbrooke, Province of Quebec, Canada

SALES OFFICES: Montreal, Toronto, St. Catharines, Vancouver. AGENCIES: London, England, E. J. Barrett, Savoy Hotel, Paris, France, Can. & Am. Continental Agency, 120 Rue de Bonaparte.



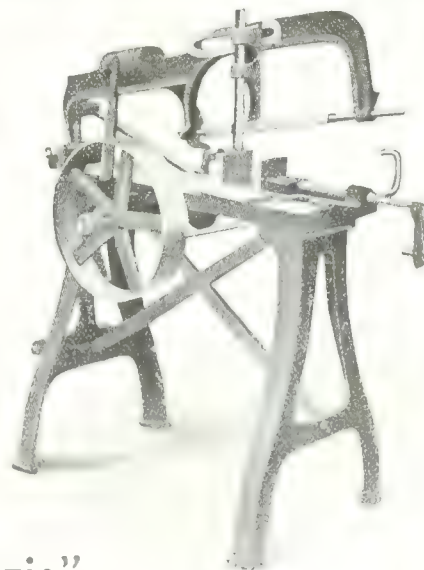
Single Purpose Lathe, air equipped for turning and finishing the driving band of Shrapnel and High Explosive Shells. British Pattern or Russian.



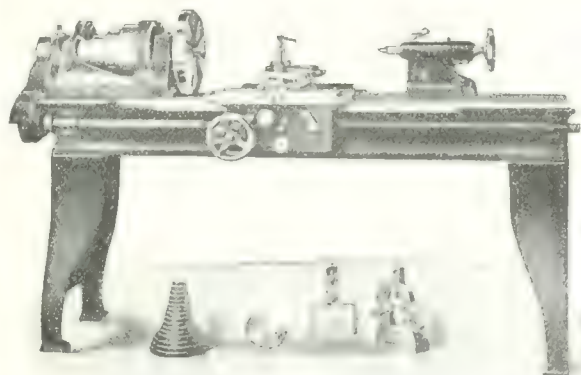
## The Improved Power Hack Saw

will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.



The Improved Saw Guide is a Special Feature — it keeps the saw perfectly in line at all times.



## The "McKenzie" Engine Lathe

The Standard of Accuracy

After the long history of the McKenzie Engine Lathe, it is not surprising that it has become the standard of accuracy in the world. Its construction is of the highest quality and its performance is of the highest order.

Let us put full details before you. Write!

**The D. McKenzie Machinery Co.**  
 GUELPH, ONTARIO

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

## "Hoyt Frost King" Babbitt Metal

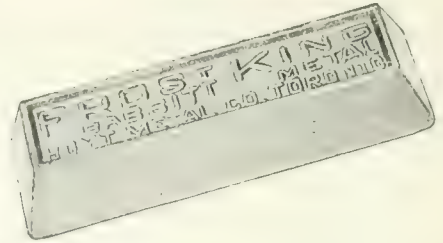
makes cool, non-friction and lasting bearings

Make its acquaintance by sending a trial order. We are sure that you'll get a service that will make you our steady customer.

### HOYT METAL COMPANY

Factory and Offices, EASTERN AVE. and LEWIS ST., TORONTO, ONT.

New York, N.Y.; London, Eng.; St. Louis, Mo.

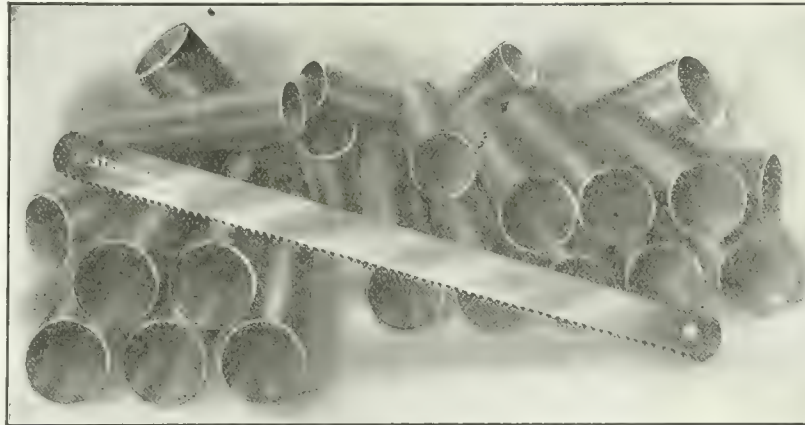


IT IS THE CHEAPEST IN THE END. We have a complete plant and every facility for manufacturing Shrapnel Bullets.

OUR PRICE AND SERVICE WILL APPEAL TO YOU.

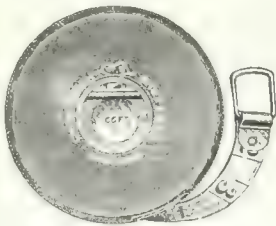
## "Sterling" Hack Saw Blades

will prove an economical investment. Give them a trial and be convinced.

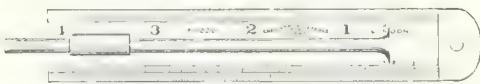


## DIAMOND SAW & STAMPING WORKS

BUFFALO, N.Y.  
U. S. A.



Wind-up Measures, Steel, Linen and Metallic. With Improved Patent Flush Handle.

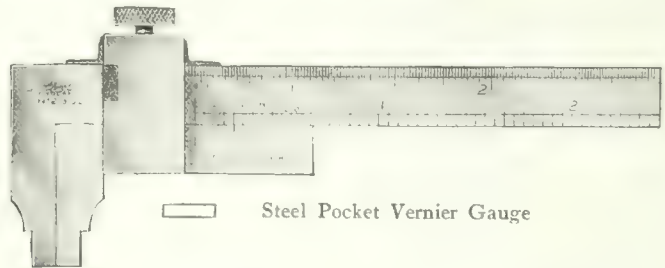


Steel Depth Gauge

## JAMES CHESTERMAN & CO., Limited

SHEFFIELD, - ENGLAND

Manufacturers of Measuring Tapes, Steel Rules, Straight Edges, Surveyors' Band Chains, Engineers' Tools.



Steel Pocket Vernier Gauge

If your dealer cannot supply you, write for catalogues, prices, etc., direct to

**F. H. SCOTT, 404 Coristine Building, MONTREAL**



## BOLT, NUT, FORGING AND WIRE NAIL MACHINERY

"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.



CANADIAN AGENT:  
**H. W. PETRIE, Ltd.**

TORONTO, ONT.  
MONTREAL, QUE.  
VANCOUVER, B.C.

*The advertiser would like to know where you saw his advertisement—tell him.*



Why go to the expense of  
buying new machines for the  
manufacture of

## SHELLS?

We have already shipped some 75 car-  
loads of

# Rebuilt Machine Tools

to CANADA since the outbreak of  
the war, with absolute satisfaction in  
each case.

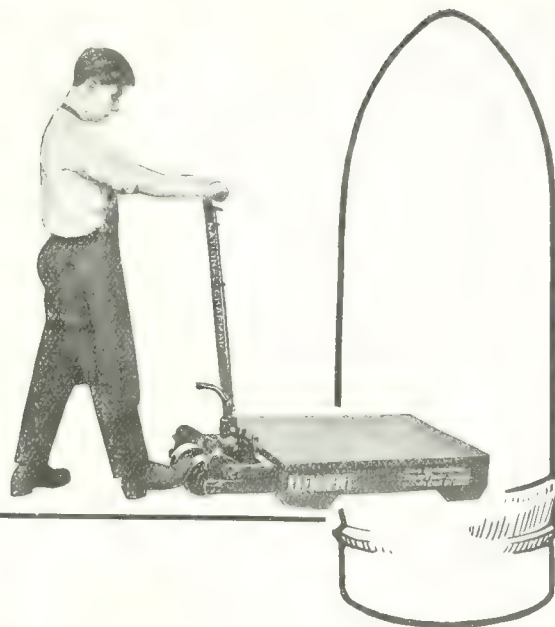
If you need any equipment it will be to  
your advantage to get in touch with us  
as our facilities for furnishing rebuilt  
machinery are second to none on the con-  
tinent.

**EVERY MACHINE WE BUY IS PUT  
THROUGH OUR OWN SHOPS AND  
COMES OUT IN ABSOLUTELY PER-  
FECT ORDER—AND WE STAND  
BEHIND EVERY ONE WE SELL.**

The demand is enormous, but we are not  
taking advantage of the war by putting  
on exorbitant prices—our aim is a good,  
square deal to everybody all the time.  
You can often get something practically  
equal to a new machine at a very great  
saving in price.

As we carry a large stock, we can likely  
supply you from stock, or if we cannot  
do this, we will take your order for fu-  
ture delivery, specifying a definite time  
when we will supply you with such tools  
as you may require.

**New York Machinery Exchange**  
50 Church St., New York



## National-Chapman Elevating Truck

**Speeds Up SHELL Production  
Reduces Labor  
Increases Profits**

This truck will save 80% in time on the  
handling of projectiles requiring many opera-  
tions; one man does the work of several;  
the several can be put on productive labor.  
Production is speeded up because Operators  
are served more efficiently. Storage and ship-  
ping are greatly simplified.

This is the new "Made in Canada" Elevating  
Truck, manufactured under Canadian Patents.  
It is solving the trucking problem and in-  
creasing profits in many of the largest Manu-  
facture Plants in Canada and the United States.

Note the prices:—

Size	Capacity	Platform Clearance	Price
17' x 37 1/2"	2,500 lbs.	6' 6"	\$865.00
17' x 37 1/2"	2,500 lbs.	7' 6"	70.00

F.O.B. Brantford, Ont., Canada. Larger sizes  
and capacities accordingly.

Drop a line for illustrated catalogue C.E.  
Our Canadian representative will gladly call  
upon request.

Address all inquiries to

**J. A. Hunter**

Canadian  
Representative

**NATIONAL SCALE CO.**  
Brantford, Ontario



# HINTS TO BUYERS

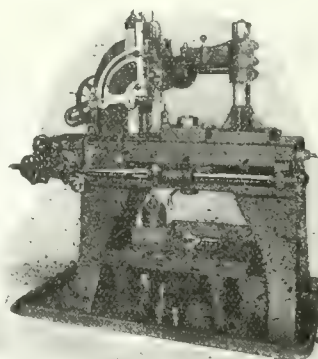
## GREETINGS

This being our twelfth birthday, we wish to express our thanks and hearty appreciation for your valued patronage, which, with that of others, has made the past year more prosperous than any other year of our phenomenally successful career.

We are especially delighted by our increasing prosperity, as it must be the result of the recognized merit of the JACOBS IMPROVED DRILL CHUCK, and our liberal, honorable dealings; because, during the past year, practically no solicitation for orders has been made.

We shall continue to employ our best endeavors, not only to maintain, but to improve the high standard of our product. We shall also continue our liberal dealings that we may merit the continuance of your valued patronage.

**THE JACOBS MANUFACTURING COMPANY**  
HARTFORD, CONN., U.S.A.



The Whiton  
**AUTOMATIC**  
Gear Cutting  
Machine

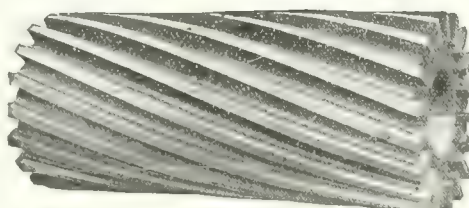
Do you want Catalog?

**The D. E. Whiton**  
Machine Co.

NEW LONDON, - CONN.

## Taylor-Newbold Milling Cutters

Fast  
Cutting  
  
Power-  
ful



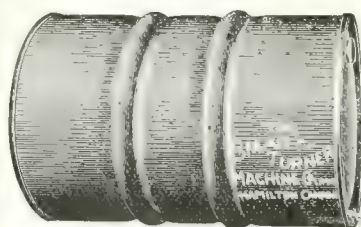
Inserted  
Helical  
Blades  
of High-  
Speed  
Steel

FOR

**Service—Utility—Strength—Power**  
4 in. DIAMETER FOR GENERAL USE

Write for Bulletin R. P.

**THE TABOR MANUFACTURING COMPANY**  
PHILADELPHIA, PA., U.S.A.



## USE STEEL BARRELS

for your Gasoline and  
Coal Oil instead of  
Leaky Wooden ones.

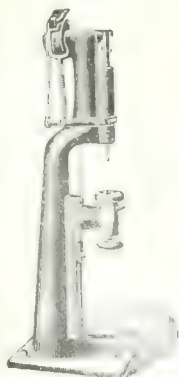
43 Imp. Gal. Galvanized Barrel, \$5.00.

**THE SMART-TURNER MACHINE CO.**

HAMILTON

LIMITED

CANADA



## IS YOUR RIVETING PROFITABLY DONE?

Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

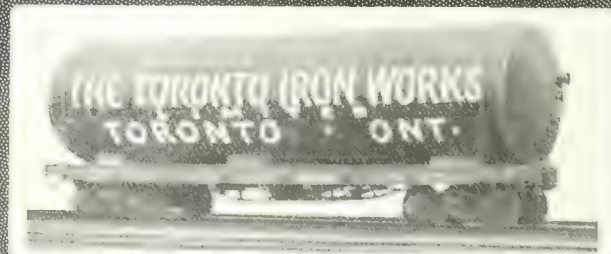
Catalogue C tells more about it.

**The F. B. SHUSTER COMPANY**  
New Haven, Conn.

Formerly John Adt & Son. Established 1866

Also makers of Wire Straighteners and  
Cutter, Cotter Pin Machines, etc.

## RIVETED STEEL TANKS FOR EVERY PURPOSE

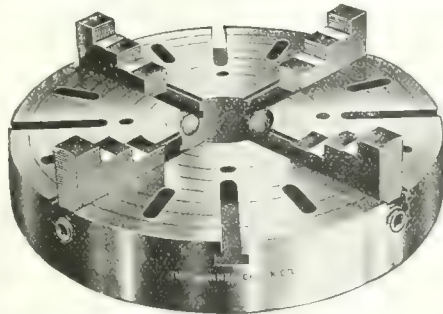


OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS  
PNEUMATIC WATER SUPPLY TANKS - SMOKE STACKS  
BOILER BREECHING - RIVETED STEEL PIPE - BINS & HOPPERS

*The advertiser would like to know where you saw his advertisement - tell him.*



## Skinner Independent Chucks



**For High  
Speed Work  
IRON OR  
STEEL BODY**

**The last word in  
chuck construction.**

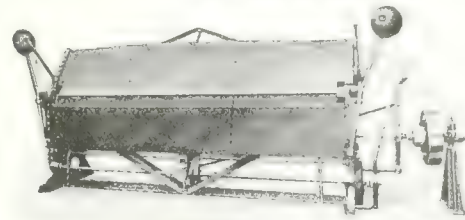
Wide jaws;  
hardened steel  
thrust bearings;  
adjusting screws  
of large diam-  
eter, threaded  
full length; jaws  
ground after  
hardening, etc.

Write us to-day  
for prices and  
new catalog.

**The Skinner Chuck Company**  
Factory and Main Office, New Britain, Conn.

## Chicago Steel Bending Brakes

We are exclusive Manufacturers of Steel Bending Brakes, and our product shows it.



Only about  
three horse-  
power is re-  
quired to  
operate this  
brake full  
capacity.

Catalog giv-  
ing full de-  
scription  
mailed upon  
request.

10 ft. for 10 Ga.

**The Steel Bending Brake Works, Ltd., Chatham, Ontario**



## Genuine Armstrong Stocks and Dies

**Hinged Pipe Vises.**

**Pipe Cutters. Steam and Gas Fitters' Tools.**

**Pipe Machines for Threading Pipe.**

**Either Hand or Power.**

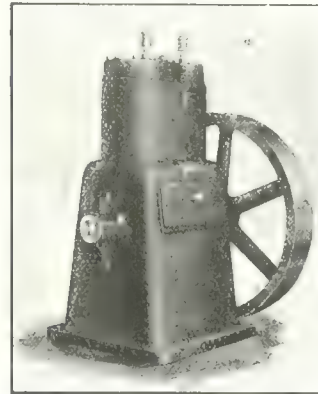
*Manufactured by*

**THE ARMSTRONG M'F'G CO.**

328 KNOWLTON ST.

BRIDGEPORT, CONN.

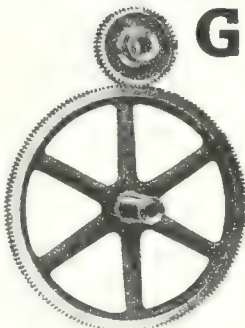
NEW YORK, 248 CANAL ST.



## Air Compressors Foot Valves Gears

**Hamilton Motor Works,  
Limited**

HAMILTON, CANADA



## GEAR

**Wheels  
Cutting**

**of every  
description.**

Matchless Raw-  
hide Pinions in  
24 hours.

**PHILADELPHIA GEAR WORKS**

Vine Street, Philadelphia, Pa.

## Eliminate All Guesswork

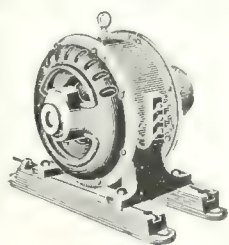
Make sure you are getting the quality and standard you are paying for. Our International Bureau of Inspection, Tests and Consultations is at your disposal.

**CANADIAN INSPECTION AND TESTING  
LABORATORIES, LIMITED**

**Head Office and Main Laboratories—MONTREAL**

**Branch Offices and Laboratories:**

TORONTO, WINNIPEG, EDMONTON, VANCOUVER,  
NEW GLASGOW.



## Do You Need Motors?

**If so, write**

**Toronto & Hamilton  
Electric Company, Limited**  
HAMILTON, ONT.

**Who make Motors for Hydro and all other  
Circuits. Dynamos for Light and Power.  
Storage Batteries.**

## THE DUPONT

**Patent**

**Power Hammer**

**BEST FOR Durability, Economy of  
Power, Simplicity of Adjustment.**

**Seven Sizes  
from 35 to 300 lbs.**

**Only High-Class Material Used and  
Satisfaction Guaranteed.**

**ASK FOR CATALOGUE.  
SENT FREE**

**The PLESSISVILLE FOUNDRY**

**Plessisville, Que.**

**Ontario and Western Agents:  
The General Supply Co. of Canada Ltd.  
Ottawa Toronto Winnipeg**





The C. J. ROOT CO., 125 Bridge Street, Bristol, Conn.

**Detective and Stop Watch Combined.**  
 "We have a counter on every one of our presses, even the foot presses." This from a satisfied user of our counters. If you use presses our counters would save you money. Ask for catalog 25.

## WELLAND MACHINE AND FOUNDRIES WELLAND LIMITED - ONTARIO

We specialize in Dies and Chills for forging Shells.

All kinds of Grey Iron and Semi-Steel Castings guaranteed clean and true to pattern.

HAND HOISTS, STRUCTURAL CASTINGS, ETC.

**Steam Hoisting  
ENGINES**

**Special  
MACHINERY**

## Manufacturers Want Facts



They must know exactly how many pieces each machine is turning out every day, every hour. They must have these facts at once, if they are going to keep an accurate check upon their production and their costs.

### DURANT COUNTERS

give you the facts on the instant, without any waiting for reports. They're made in thirty different styles, applicable to almost any kind of machines in any kind of factory. Simple, strong and durable.

Write for Illustrated Catalog No. 25

DURANT MFG. CO., Milwaukee, Wis.

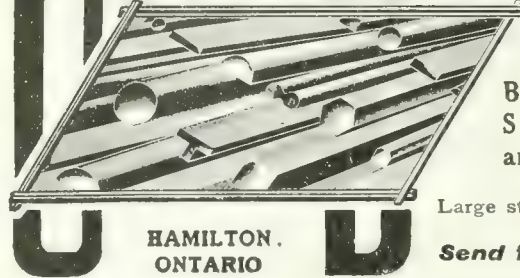


## GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St.  
Boston, Mass.  
G. B. GRANT

## UNION DRAWN STEEL CO. LTD.



Manufacturers of

Bright Finished  
Steel Shafting  
and Shapes.

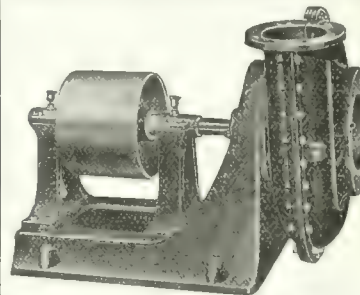
Large stock of all sizes.

Send for Price List

HAMILTON,  
ONTARIO

The Best Insurance  
against expensive  
break-down delays  
is

## A RELIABLE PUMP



AS BUILT BY

THE SMART-TURNER MACHINE CO.

LIMITED

HAMILTON

CANADA

## The Garvin Machine Co.

### Manufacturers of

Milling Machines; Profiling Machines; Cam Cutting Machines; Screw Machines; Monitor Lathes; Die Slotting Machines; Screw Slotters; Tapping Machines; Duplex Horizontal Drills; Gang Drill Presses; Four-Head Right-Angle Drills; Wrenchless Chucks; Spring Coilers; Cutter Grinding Machines; Surface Grinders; Hole Grinders; Hand Lathes and Special Machinery.

We Want All To Have Our Catalog—Send For It To-day.

Spring and Varick Streets NEW YORK CITY

## Railway and Highway Bridges

Locomotive  
Turn  
Tables



Structural  
Steel  
and Iron  
Work

Steel Buildings

Roof Trusses

## AUTOMATIC WOOD SCREW MACHINES

Cable Address:  
Cook, Hartford, U.S.A.

Asa S. Cook Co.

Hartford,  
Conn.

The advertiser would like to know where you saw his advertisement—tell him.



## Toronto Testing Laboratory

METALLURGISTS CHEMISTS FUEL ENGINEERS  
160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.  
SPECIAL ATTENTION TO ALL SHELL MATERIALS



## NORTON JACKS

For all kinds of heavy lifting  
Send for complete catalogue showing 50 styles  
10 to 100 tons capacity.

Made only by

A. J. NORTON, LIMITED

Coaticook, Prov. Quebec

Canada

Safety Set Screw

Socket Cap Screw



Allen Safety  
Set Screws  
and  
Socket Cap  
Screws



Send for circular No. 3 and sample screws

THE ALLEN MANUFACTURING CO.

Hartford, Conn., U.S.A.

173 PRINCESS ST., MANCHESTER, ENGLAND

# VIKING

## WATERPROOF CEMENT LEATHER BELTS

Will Save You Much Money, Time, Trouble and Worry

"Viking" Belts are just in their element when in wet places and under adverse conditions.

A trial will convince you that they are all-round savers.

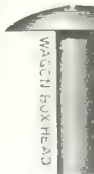
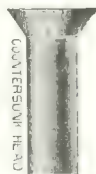
Write for particulars.

J. C. McLaren Belting Co., Limited

MONTREAL

TORONTO

WINNIPEG



WE MANUFACTURE RIVETS of every description, 1/2 inch. dia. and smaller.

PARMENTER & BULLOCH CO., LTD.

GANANOQUE, ONT.

NORTHERN CRANE  
WORKS, Limited  
WALKERVILLE, ONT.

BUY IN CANADA !



# NORTHERN CRANES

ELECTRIC AND HAND POWER

ALL SIZES, CAPACITIES AND TYPES

ALSO ELECTRIC AND AIR HOISTS

Foundry Equipment—Cupolas, Ladles, Etc.



## PRESSES — ALL TYPES

Press Attachments, Automatic.  
Metal and Wire Forming Machines.  
Tumblers—Large Line.  
Burnishing Machines. Grinders.  
Special Machines.

Baird Machine Co., Bridgeport, Conn.



# CLUTCHES

Combined Jaw and Friction. Friction only  
Gas Engine Clutches. Jaw Clutches.

Write for interesting printed matter.

The Positive Clutch & Pulley Works Ltd.  
MONTREAL Factory: Aurora, Ont. TORONTO



Modern practice decrees "Make your dollars bring the greatest possible returns."

How much money do you spend a year in belting?

The Dollars we can save you.

The Satisfaction we can give you

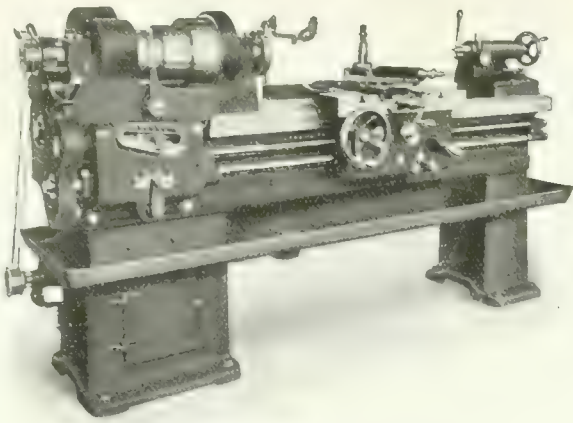
The Economy we can promise you will answer the decree of modern practice as far as your belts are concerned.

Let us help you solve your belting problems.

Main Belting Co. of Canada  
LIMITED

10 1/2 St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.



THE "OLIVER" 16-INCH  
HEAVY DUTY  
**ENGINE LATHE**

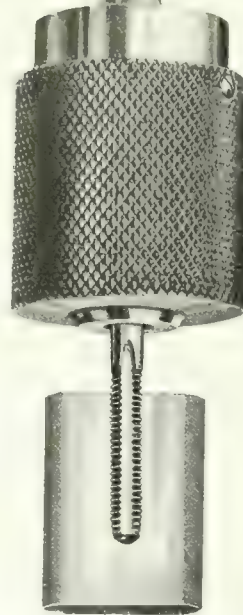
POWERFUL  
DOUBLE BACK GEARED  
QUICK-CHANGE GEAR BOX  
THREAD CUTTING

EARLY DELIVERIES

Write for Engine Lathe Bulletin No. 47  
Write for Turret Lathe Bulletin No. 47T

**Oliver Machinery Co.**  
Grand Rapids, Michigan, U.S.A.

# The Tap Can't Break



## The Woodstock Tapping Chuck

enables you to drive taps to the bottoms of blind holes in toughest of metals with **no tap breakage**; enables you to use 95% of the strength of the tap while at the same time cutting 50% off tapping cost.

It eliminates tap breakage because the chuck automatically releases the instant the tap binds or reaches the bottom of the hole.

Every shop profits by their use.

Drop a line for full description.

**Peter Bros. Mfg. Co.**  
ALGONQUIN, ILL.

*Tapping to the bottom of the hole*

# TURNER TURRET

—a machine tool that does drilling, threading, reaming, undercutting, counterboring, etc., on *Fuse Timing and Detonator parts of SHELLS* with Marvellous Speed and Accuracy.

WITH THE TURRET 4, 5, 6 OPERATIONS ARE POSSIBLE WITHOUT RESETTING. The Tools revolve and Turret automatically indexes successive tools to exactly the same working centre. Only the working spindle rotates.

There is no fatigue from indexing Turret and no lost time through stopping for chucking or shifting of work.

Trunnion Chucks make working on several sides possible with one chucking.

The Turner Turret minimizes idle movements, there being but a fraction of a second between successive tools.

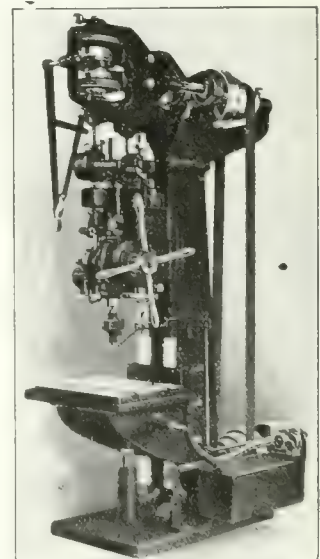
Turret is suspended within rigid, accurate case. Detent located in case and fits adjustable sockets in turret. *Very wide range work.* Hand and power feed.

*Mail us your blue prints and let us give you estimates on the Turner Turret. Ask for catalog.*

**Turner Machine Company**  
Danbury, Conn., U.S.A.

Incorporated with

Turner, Atherton & Co., Limited  
Denton, Manchester and Stockport, England.



*The advertiser would like to know where you saw his advertisement—tell him.*



# CANADIAN MACHINERY BUYERS' DIRECTORY

TO OUR READERS—Use this directory when seeking to buy any machinery or power equipment.

You will often get information that will save you money.

TO OUR ADVERTISERS—Send in your name for insertion under the headings of the lines you make or sell.

TO NON-ADVERTISERS—A rate of \$5 per line a year is charged non-advertisers.

## Abrasive Materials.

Can. Fairbanks-Morse Co., Montreal.  
Carborundum Co., Niagara Falls, N.Y.  
Ford-Smith Machine Co., Hamilton, Ont.

Gardner Machine Co., Beloit, Wis.

Norton Co., Worcester, Mass.

H. W. Petrie, Toronto.

Stevens, F. B., Detroit, Mich.

## Acetylene.

L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

## Acetylene Generators.

L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

## Accumulators, Hydraulic.

Can. Boomer & Boschert Press Co., Montreal.

Charles F. Elmes Eng. Works, Chicago.

Mesta Machine Co., Pittsburgh, Pa.

William R. Perrin, Ltd., Toronto.

Southwark Foundry & Machine Co., Philadelphia.

Wm. Tool Company, Youngstown, O.

Watson-Stillman Co., Aldene, N.J.

West, R. D., & Co., Philadelphia.

## Air Compressors.

Canadian Ingersoll-Rand Co., Ltd., Montreal.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Curtis Pneumatic Machinery Co., St. Louis, Mo.

H. W. Petrie, Toronto.

Smart-Turner Machine Co., Hamilton, Ont.

## Air Hoists.

Northey Crane Works, Ltd., Walkerville, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

## Air Hose.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Can. Ingersoll Rand Co., Montreal.

## Air Receivers.

Can. Ingersoll-Rand Co., Montreal.

MacKinnon, Holmes & Co., Sherbrooke, Que.

## Air Washers.

Buffalo Forge Co., Buffalo, N.Y.

Can. Sirocco Co., Ltd., Windsor, Ont.

## Annometers.

Can. H. W. Johns-Manville Co., Limited, Toronto.

## Aluminin.

Tallman Brass & Metal Co., Hamilton.

## Alloys, Steel.

H. A. Drury Co., Ltd., Montreal.

Hawbridge Bros. Co., Boston, Mass.

Vanadium Alloys Steel Co., Pittsburgh, Pa.

Vulcan Crucible Steel Co., Aliquippa, Pa.

## Annunciator Systems.

Lintz-Porter Co., Toronto.

## Arbors.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill and Machine Co., New Bedford.

H. W. Petrie, Toronto.

Plessisville Foundry, Plessisville, Que.

Pratt & Whitney Co., Dundas, Ont.

## Assembling Stands.

Skinner Chuck Co., New Britain, Conn.

## Automatic Chucks.

Gavin Machine Co., New York.

## Asbestos Packing.

Can. H. W. Johns-Manville Co., Limited, Toronto.

## Autogenous Welding and Cutting Plants.

L'Air Liquide Society, Montreal, Toronto.

## Lever Bros., Toronto.

## Automatic Index Milling Machines.

Gavin Machine Co., New York.

National Machinery and Supply Co., Hamilton.

H. W. Petrie, Toronto.

## Automatic Machinery.

Raid Machine Co., Bridgeport, Conn.

A. R. Williams Machs. Co., Toronto.

Gardner, Robt. & Son, Montreal.

Grand Machine & Tool Co., Philadelphia, Pa.

Motch & Merryweather Machs. Co., Cleveland, O.

National Machinery & Supply Co., Hamilton.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Owen Sound Iron Works Co., Owen Sound.

Windsor Machine Co., Windsor, Vt.

Automatic Multiple Spindle.

Windsor Machine Co., Windsor, Vt.

Automatic Wood Screw Machines.

Ass F. Cook Co.

Axle Cutters.

Butterfield & Co., Rock Island, Que.

A. B. Jardine & Co., Hespeler, Ont.

Rabbitt Metal.

Can. Fairbanks-Morse Co., Montreal.

Hoyt Metal Co., Toronto.

Magnolia Metal Co., Montreal.

H. W. Petrie, Toronto.

Tallman Brass & Metal Co., Hamilton.

Baking Ovens.

Oven Equipment & Mfg. Co., New Haven, Conn.

Owen Sound Iron Works Co., Owen Sound.

Ball Bearings.

Can. Fairbanks-Morse Co., Montreal.

Chapman Double Ball Bearing Company, Toronto.

H. W. Petrie, Toronto.

B. I. Burnishing Machines.

Baird Machine Co., Bridgeport, Conn.

Banding Machines, Hydraulic.

West Tire Setter Co., Rochester, N.Y.

Barrels, Steel Shop.

Baird Machine Co., Bridgeport, Conn.

Cleveland Wire Spring Co., Cleveland.

Bar Steel.

Steel Co. of Canada, Hamilton, Ont.

Bars, Boring.

Charles F. Elmes Eng. Works, Chicago.

Niles-Bement-Pond Co., New York.

Owen Sound Iron Works Co., Owen Sound.

Bar Benders and Straight Edges.

Steel Bending Brake Works, Ltd., Chatham, Ont.

Bar Benders, Hydraulic.

Charles F. Elmes Eng. Works, Chicago.

Watson-Stillman Co., Aldene, N.J.

Bar Twisting Machines.

Mesta Machine Co., Pittsburgh, Pa.

Batteries and Accessories.

Lintz-Porter Co., Toronto.

Belt Systems.

Lintz-Porter Co., Toronto.

Belt Benches.

Tabor Mfg. Co., Philadelphia, Pa.

Belt Dressing and Cement.

Graton & Knight Mfg. Co., Montreal.

Belt Lacing Leather.

Graton & Knight Mfg. Co., Montreal.

Belted Chain.

Can. Fairbanks-Morse Co., Montreal.

Graton & Knight Mfg. Co., Montreal.

Jones & Glasson, Montreal.

Morse Chain Co., Ithaca, N.Y.

H. W. Petrie, Toronto.

Belting, Cotton.

General Supply Co. of Canada, Ltd., Ottawa.

Dominion Belting Co., Hamilton.

H. W. Petrie, Toronto.

Belting, Leather.

Can. Fairbanks-Morse Co., Montreal.

General Supply Co. of Canada, Ltd., Ottawa.

Dominion Belting Co., Hamilton, Ont.

Main Belting Co., Montreal.

H. W. Petrie, Toronto.

Belting, Rubber.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Benders, Angle and Tee Iron.

Can. Buffalo Forge Co., Montreal.

Watson-Stillman Co., Aldene, N.J.

Bending Machinery.

John Bertram & Sons Co., Dundas.

Bertrams, Limited, Edinburgh, Scotland.

Bliss E. W. Co., Brooklyn, N.Y.

Brown Boggs Co., Ltd., Hamilton, Canada.

Can. Buffalo Forge Co., Montreal.

Can. Machinery Corporation, Galt, Ont.

Charles F. Elmes Eng. Works, Chicago.

Jardine A. B. & Co., Hespeler, Ont.

National Machinery Co., Tiffin, Ohio.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Owen Sound Iron Works Co., Owen Sound.

H. W. Petrie, Toronto.

Toledo Machine & Tool Co., Toledo, O.

Steel Bending Brake Works, Chatham, Ont.

Watson-Stillman Co., Aldene, N.J.

Bins, Steel.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

MacKinnon, Holmes & Co., Sherbrooke, Que.

Toronto Iron Works, Ltd., Toronto.

Bit Brace Tools.

Wells Bros. Co., Greenfield, Mass.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Blast Gauges, Cupola.

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

Blocks, Lifting.

Northern Crane Works, Walkerville.

Blowers.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Chicago Flexible Shaft Co., Chicago, Ill.

Grand Machine & Tool Co., Philadelphia, Pa.

Sheldons, Ltd., Galt, Ont.

Southwark Foundry & Machine Co., Philadelphia.

Blow Pipes and Regulators.

L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

Bluing Ovens.

Oven Equipment & Mfg. Co., New Haven, Conn.

Boilers.

Can. Locomotive Co., Kingston, Ont.

Grand Supply Co. of Canada, Ltd., Ottawa.

MacKinnon, Holmes & Co., Sherbrooke, Que.

National Machinery & Supply Co., Hamilton.

Owen Sound Iron Works Co., Owen Sound.

H. W. Petrie, Toronto.

Plessisville Foundry, Plessisville, Que.

Boiler Compound.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Boiler Graphite.

Dixon Crucible Co., Jersey City, N.J.

Boiler Makers' Supplies.

Jno. P. Allen Co., New York.

Bolt Cutters and Nut Tapers.

Wells Brothers Co., Greenfield, Mass.

Bolts.

Galt Machine Screw Co., Galt, Ont.

London Bolt & Hinge Works, London, Ont.

Steel Co. of Canada, Hamilton, Ont.

Bolt and Nut Machinery.

A. R. Williams Machs. Co., Toronto.

John Bertram & Sons Co., Dundas, Ont.

Owen Sound Iron Works Co., Owen Sound.

Gardner, Robt. & Son, Montreal.

Landis Machine Co., Waynesboro, Pa.

National Machinery Co., Tiffin, O.

National Machinery & Supply Co., Hamilton.

H. W. Petrie, Toronto.

Wiley & Russell Co., Greenfield, Mass.

Books.

MacLean Publishing Co., Toronto.

Boring Machines, Upright and Horizontal.

John Bertram & Sons Co., Dundas.

Colburn Machine Tool Co., Franklin, Pa.

Garlock-Machinery, Toronto.

Grand Machine & Tool Co., Philadelphia, Pa.

Hill Clarke & Co., of Chicago, Chicago, Ill.

Motch & Merryweather Machs. Co., Cleveland, O.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Stow Mfg. Co., Binghamton, N.Y.

Boring Machines, Pneumatic.

Cylinders.

Baker Brothers, Toledo, O.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Can. Fairbanks-Morse Co., Montreal.

Can. Ingersoll Rand Co., Montreal.

Independent Pneumatic Tool Co., Chicago, Ill.

H. W. Petrie, Toronto.

Stow Mfg. Co., Binghamton, N.Y.

## Boring and Turning Mills.

John Bertram & Sons Co., Dundas.

Grand Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.

Boxes, Annealing, Charging.

Mesta Machine Co., Pittsburgh, Pa.

Box Puller.

Jardine, A. B. & Co., Hespeler, Ont.

Boxes, Steel Shop.

Cleveland Wire Spring Co., Cleveland.

Boxes, Lote.

Cleveland Wire Spring Co., Cleveland.

Brakes.

Brown, Boggs & Co., Hamilton, Can.

Whiting Foundry Equipment Co., Harvey, Ill.

Brakes, Heavy Plate Bending and Cornice.

Steel Bending Brake Works, Ltd., Chatham, Ont.

Brass Working Machinery.



**Castings, Aluminum.**

Cunningham & Son, St. Catharines, Ont.  
Owen Sound Iron Works Co., Ltd., Owen Sound, Ont.  
St. Lawrence Foundry, Galt, Ont.  
Tallman Brass & Metal Co., Hamilton

**Castings, Air Furnaces.**

Wm. Tod Company, Youngstown, O.

**Castings, Brasses.**

Cunningham & Son, St. Catharines, Ont.  
Alexander Fleck, Ltd., Ottawa.  
T. C. Lawrence Foundry, Galt, Ont.  
Mesta Machine Co., Pittsburg, Pa.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Plessisville Foundry, Plessisville, Que.  
Tallman Brass & Metal Co., Hamilton  
Wm. Tod Company, Youngstown, O.

**Castings, Bronze.**

Cunningham & Son, St. Catharines, Ont.  
Mesta Machine Co., Pittsburg, Pa.  
Tallman Brass & Metal Co., Hamilton  
Wm. Tod Company, Youngstown, O.

**Castings, Copper.**

Cunningham & Son, St. Catharines, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Castings, Gray Iron.**

Brown, Boggs Co., Ltd., Hamilton, Canada.  
Erie Foundry Co., Erie, Pa.  
Alexander Fleck, Ltd., Ottawa.  
Gardner, Robt., & Son, Montreal.  
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Mesta Machine Co., Pittsburg, Pa.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Plessisville Foundry, Plessisville, Que.  
Wm. Tod Company, Youngstown, O.

**Castings, Steel Chrome and Manganese Steel.**

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Mesta Machine Co., Pittsburg, Pa.  
Wm. Tod Company, Youngstown, O.

**Castings, Malleable.**

Galt Malleable Iron Co., Galt.

**Castings, Nickel Steel.**

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Mesta Machine Co., Pittsburg, Pa.

**Cement, Disc Wheel.**

Gardner Machine Co., Beloit, Wis.

**Cement, Iron.**

Can. H. W. Johns-Manville Co., Limited, Toronto.  
Shelton Metallic Filler Co., Derby, O.

**Cement Machinery.**

Can. Fairbanks-Morse Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
National Machinery & Supply Co., Hamilton, Ont.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
H. W. P. T. Co., Toronto.

**Centre Reamers.**

Wells Brothers Co., Greenfield, Mass.

**Centering Machines.**

John Bertram & Sons Co., Dundas.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hurlbut, Rogers Machinery Co., Southbury, Mass.  
National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

**Centrifugal Pumps.**

Can. Buffalo Forge Co., Montreal.  
H. W. P. T. Co., Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Southwick Foundry & Machine Co., Philadelphia, Pa.  
Smart-Turner Machine Co., Hamilton, Ont.

**Chain Blocks.**

Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton.

**Chains, Silent and Transmission.**

Jones & Glasco, Montreal.  
Morse Chain Co., Ithaca, N.Y.  
Plessisville Foundry, Plessisville, Que.

**Chemists.**

Can. Inspection & Testing Laboratories, Ltd., Montreal.  
Toronto Testing Laboratory, Ltd., Toronto.

**Chucks, Aero, Automatic.**

Gardner Machine Co., New York.

**Chucks, Drill, Lathe and Universal.**

John Bertram & Sons Co., Dundas, Ont.  
Buffalo Forge Co., Buffalo, N.Y.  
Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.  
Cushman Chuck Co., Hartford, Conn.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Wells Brothers Co., Greenfield, Mass.  
Jacobs Mfg. Co., Hartford, Conn.  
Ker & Goodwin, Brantford.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co., New Bedford.  
National Machinery & Supply Co., Hamilton.

H. W. P. T. Co., Toronto.  
Skinner Chuck Co., New Britain, Conn.  
D. E. Whiton Machine Co., New London, Conn.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Chucks, Drill, Automatic and Keyless.**

Buffalo Forge Co., Buffalo, N.Y.

**Chucks, Ring Wheel.**

Gardner Machine Co., Beloit, Wis.

**Chucking Machines.**

Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
New Britain Machine Co., New Britain, Conn.  
Niles-Bement-Pond Co., New York.  
Turner Machine Co., Danbury, Conn.  
Warner & Swasey Co., Cleveland, O.

**Clocks, Time and Watchman's.**

Lutz-Porter Co., Toronto.

**Cloth and Wool Dryers.**

Canada Wire & Iron Goods Co., Hamilton, Ont.  
Sheldons, Limited, Galt.

**Clutches.**

Eastern Machinery Co., New Haven, Conn.  
Jones & Glasco, Montreal.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Positive Clutch & Pulley Works, Ltd., Toronto.

**Coal Handling Machinery.**

Niles-Bement-Pond Co., New York.

Whiting Foundry Equipment Co., Harvey, Ill.

**Coke and Coal.**

Hanna & Co., M. A., Cleveland, O.

**Collectors, Pneumatic.**

Can. Buffalo Forge Co., Montreal.  
Sheldons, Limited, Galt.

**Compressors, Air.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.  
Mesta Machine Co., Pittsburg, Pa.  
National Machinery & Supply Co., Hamilton.  
H. W. P. T. Co., Toronto.  
Southwick Foundry & Machine Co., Philadelphia, Pa.  
The Smart-Turner Machine Co., Hamilton.

**Concentrating Plant.**

Gardner, Robt., & Son, Montreal.

**Concrete Mixers.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton.

**Concrete Reinforcement.**

Canada Wire Goods Mfg. Co., Hamilton.

**Condensers.**

Can. Buffalo Forge Co., Montreal.  
Mesta Machine Co., Pittsburg, Pa.  
The Smart-Turner Machine Co., Hamilton.  
Southwick Foundry & Machine Co., Philadelphia, Pa.  
Wm. Tod Company, Youngstown, O.

**Contracting Engineers, Electrical.**

Lutz-Porter Co., Toronto.

**Controllers and Starters.**

Electric Motor.  
A. R. Williams Machy. Co., Toronto.  
H. W. P. T. Co., Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.

**Conveyor Machinery.**

Brown Boggs Co., Ltd., Hamilton, Canada.  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton, Ont.  
H. W. P. T. Co., Toronto.  
Plessisville Foundry, Plessisville, Que.  
The Smart-Turner Machine Co., Hamilton.

**Coping Machines.**

Can. Buffalo Forge Co., Montreal.  
John Bertram & Sons Co., Dundas.  
National Machinery & Supply Co., Hamilton, Ont.  
Niles-Bement-Pond Co., New York.

**Cornice Brakes.**

Brown Boggs Co., Ltd., Hamilton, Canada.  
Steel Bending Brake Wks., Chatham.

**Counting Machines.**

W. N. Durant Co., Milwaukee, Wis.  
National Scale Co., Chicopee Falls, Mass.  
C. J. Root Co., Bristol, Conn.

**Counterbores and Countersinks.**

Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co., Greenfield, Mass.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Countershafts.**

Baird Machine Co., Bridgeport, Conn.  
Wells Bros. Co., Greenfield, Mass.

**Country House Lighting and Cooking.**

Can. Blaugas Co., Montreal.

**Couplings.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.  
Eastern Machinery Co., New Haven, Conn.  
Gardner, Robt., & Son, Montreal.  
Owen Sound Iron Works Co., Owen Sound, Ont.

**Couplings, Air Hose.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Crabs, Travelling.**

Owen Sound Iron Works Co., Owen Sound, Ont.

**Cranes, Locomotive.**

Northern Crane Works, Walkerville.

**Cranes, Gantry.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Goliath.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Hydraulic.**

Southwick Foundry & Machine Co., Philadelphia, Pa.  
Watson-Stillman Co., Aldene, N.J.

**Cranes, Pneumatic.**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Post Jib.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Portable.**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Swing Jib.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Transfer.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Wall.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Travelling Electric and Hand Power.**

Dominion Bridge Co., Montreal.  
Niles-Bement-Pond Co., New York.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, All Kinds.**

Northern Crane Works, Walkerville.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Southwick Foundry & Machine Co., Philadelphia, Pa.  
Whiting Foundry Equipment Co., Harvey, Ill.  
Crank Pin Turning Machine.  
Niles-Bement-Pond Co., New York.

**Crimps, Leather.**

Graton & Knight Mfg. Co., Montreal.

**Cupolas.**

Can. Buffalo Forge Co., Montreal.  
Northern Crane Works, Walkerville.  
H. W. P. T. Co., Toronto.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cupola and Blast Gate Blowers.**

Can. Sirocco Co., Ltd., Windsor, Ont.

**Cupola Blast Gauges & Blowers.**

Sheldons, Ltd., Galt, Ont.

**Cutters, Angle, Tee Iron and Bar.**

Can. Buffalo Forge Co., Montreal.

**Cutters, Flue.**

Independent Pneumatic Tool Co., Chicago.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Cutters, Pipe.**

Can. Fairbanks-Morse Co., Montreal.  
A. B. Jardine & Co., Hespeler, Ont.  
Trumont Mfg. Co., Roxbury, Mass.

**Cutting Compound & Cutting Oil.**

Can. Economic Lubricant Co., Montreal.  
Can. Oil Companies, Toronto.  
Catacraft Refining Co., Buffalo, N.Y.  
Crescent Oil Co., New York.  
Racine Tool & Machine Co., Racine, Wis.

**Cutter Grinders and Attachments**

Cincinnati Milling Machine Co., Cincinnati.  
Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

**Cutters, Milling.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Gardner Machine Co., New York.  
Morse Twist Drill and Machine Co., New Bedford.  
H. W. P. T. Co., Toronto.  
Tabor Mfg. Co., Philadelphia, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Cutting-off Machines.**

Armstrong Bros. Tool Co., Chicago.  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
Espin-Lucas Machine Wks., Philadelphia, Pa.  
Foss & Hill Machy. Co., Montreal.  
Garlock-Machinery, Toronto.  
Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Geo. Gorton Machine Co., Racine, Wis.  
Hurlbut, Rogers Machinery Co., Southbury, Mass.  
John H. Hall & Sons, Brantford, Ont.  
Nutter & Barnes Co., Hinsdale, N.H.  
H. W. P. T. Co., Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Tabor Mfg. Co., Philadelphia, Pa.  
L. S. Starrett Co., Athol, Mass.

**Damper Regulators.**

Can. Fairbanks-Morse Co., Montreal.

**Derricks.**

Dominion Bridge Co., Montreal.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Designers, Special Machinery.**

Baird Machine Co., Bridgeport, Conn.

**Dies and Die Stocks.**

Armstrong Mfg. Co., Bridgeport, Conn.  
Bainfield, W. H. & Son, Toronto.  
Bainfield & Co., Rock Island, Que.  
Brown, Boggs & Co., Hamilton, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Duncan Electrical Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
A. B. Jardine & Co., Hespeler, Ont.  
M. J. H. & Co., Pittsburg, Pa.

Modern Tool Co., Erie, Pa.

Morse Twist Drill and Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Wiley & Russell, Greenfield, Mass.

**Dies for Bit Brace Use.**

Wells Brothers Co., Greenfield, Mass.

**Die Sinks.**

Gardner Machine Co., New York.

**Dies for Machines.**

Wells Brothers Co., Greenfield, Mass.  
The Sinking Presses, Hydraulic.  
Charles F. Elmes Eng. Works, Chicago.  
Watson-Stillman Co., Aldene, N.J.

**Dies, Self-opening.**

Duncan Electrical Co., Montreal.  
Geometric Tool Co., New Haven.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Landis Machine Co., Waynesboro, Pa.  
Mathews, J. H. & Co., Pittsburg, Pa.

**Modern Tool Co., Erie, Pa.**

Murphy Machine & Tool Co., Detroit



# ACCURACY



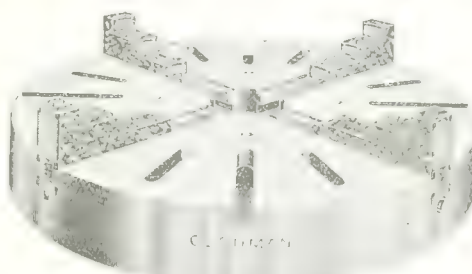
Good screws must have good threads—in both fit and finish.

When nuts are added and drawn up tight, the contact is even. "**GALT**" Cap and Set Screws are always accurate.

*Specialists in Cap and Set Screws.*

THE  
**GALT MACHINE SCREW CO.,**  
GALT, ONTARIO LIMITED

# Cushman Chucks



When you buy a Cushman Chuck, you are absolutely sure of getting one of the strongest, accuracy and durability. Being specialists in these goods we are able to furnish Chucks of quality at a very moderate price.

Our line of styles and sizes is very complete—

**Lathe Chucks, Drill Chucks, Centering Chucks, Portable Face Plate Jaws**

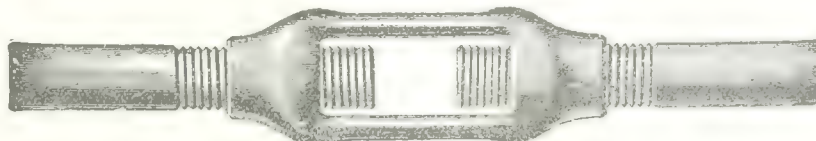
Our regular chucks are known as the heavy pattern, but we now have a new line called "Blue Line" Chucks, made entirely of steel.

Let us send you our catalog.

**The Cushman Chuck Co.**  
Hartford, Conn., U.S.A.



Pliers, Structural Wrenches, Track Wrenches, Machine Wrenches, Eye Bolts, Lathe Dogs, Journal Box Wedges, Etc.



All Kinds Of Special Drop Forgings

Send Models or Blue Prints for Estimates

WRITE FOR CATALOG

Canadian Billings & Spencer, Limited, Welland, Ontario

Buy an  
**ALLEN** Portable Pneumatic **RIVETER**  
AND BE SURE OF THE **FASTEST AND TIGHTEST** RIVETING AT THE LOWEST COST. →

"Whatever the riveting, there's an **ALLEN** for the job."

Special riveters designed to meet all requirements.

*Send for Illustrated Catalogue.*

**JOHN F. ALLEN COMPANY,** (Established 1872)  
370-372 Gerard Avenue, NEW YORK

*Liebers and W. U. Cates, "Riveter."*

AGENTS—**Canadian Ingersoll-Rand Co., Ltd.,** Toronto, Ont.; Montreal, Que.; Winnipeg, Man.; Vancouver, B.C.; Sydney, N.S.; Cobalt, Ont.; Lethbridge, Alta.; Nelson, B.C.; So. Porcupine



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



**Dies, Opening.**

W. H. Bannard & Sons, Toronto.  
 Can. Fairbanks-Morse Co., Montreal.  
 Colburn Machine Tool Co., Franklin, Pa.  
 Greenfield Tap & Die Corporation, Greenfield, Mass.  
 A. B. Jardine & Co., Hespeler, Ont.  
 Lakeside Machine Co., Waynesboro, Pa.  
 M. J. Jones & Co., Ltd., London, Ont.

Monarch Tool Co., Erie, Pa.  
 American Machine & Tool Co., Ltd., New York.

Pratt & Whitney Co., Dundas, Ont.

**Dies for Steel Plates.**

Wells Brothers Co., Greenfield, Mass.

**Dies, Sheet Metal Working.**

E. W. Bliss Co., Brooklyn, N.Y.

Brown, Boggs & Co., Hamilton, Can.

**Dies, Screws and Thread.**

Armstrong Mfg. Co., Bridgeport, Conn.

Greenfield Tap & Die Corporation, Greenfield, Mass.

Lakeside Machine Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

Murphy Machine & Tool Co., New York.

**Dies, Leather.**

Graton & Knight Mfg. Co., Montreal.

**Draughtsmen's Tools.**

Emmett Mfg. Co., Waynesboro, Pa.

**Drill, Mechanical.**

W. H. Bannard & Sons, Toronto.

Butterfield & Co., Rock Island, Que.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Windsor, Ont.

A. B. Jardine & Co., Hespeler, Ont.

Pratt & Whitney Co., Dundas, Ont.

Sheldons, Limited, Galt, Ont.

**Drill Bit Cutters.**

Cleveland Pneumatic Tool Co., Canada, Toronto.

**Drill Presses.**

Baker Bros., Toledo, O.

W. F. & John Barnes Co., Rockford, Ill.

Can. Buffalo Forge Co., Montreal.

Colburn Machine Tool Co., Franklin, Pa.

Foss & Hill Machy. Co., Montreal.

H. W. Petrie & Co. of Chicago, Chicago, Ill.

Garvin Machine Co., New York.

Grand Machine & Tool Co., Philadelphia, Pa.

Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.

A. R. Williams Machinery Co., Toronto.

**Drilling Machines, Locomotive and Multiple Spindle**

Amalgamated Machy. Corporation, Chicago, Ill.

Baker Bros., Toledo, O.

Barnes Drill Co., Rockford, Ill.

John Bertram & Sons Co., Dundas, Can.

Can. Fairbanks-Morse Co., Montreal.

Colburn Machine Tool Co., Franklin, Pa.

Garlock-Machinery, Toronto.

Garvin Machine Co., New York.

Grand Machine & Tool Co., Philadelphia, Pa.

A. B. Jardine & Co., Hespeler, Ont.

Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.

**Drilling Machines, Radial and Turret.**

Baker Bros., Toledo, O.

Barnes Drill Co., Rockford, Ill.

John Bertram & Sons Co., Dundas, Can.

Can. Fairbanks-Morse Co., Montreal.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.

**Drilling Machines, Sensitive.**

Baker Bros., Toledo, O.

W. F. & John Barnes Co., Rockford, Can.

Can. Fairbanks-Morse Co., Montreal.

Niles-Bement-Pond Co., New York.

Rockford Machine Tool Co., Rockford, Ill.

**Drilling Machines, Upright and Horizontal.**

Amalgamated Machy. Corporation, Chicago, Ill.

Baker Bros., Toledo, O.

Barnes Drill Co., Rockford, Ill.

Colburn Mach. Tool Co., Franklin, Pa.

A. R. Williams Machy. Co., Toronto.

W. F. & John Barnes Co., Rockford, Can.

Can. Fairbanks-Morse Co., Montreal.

Garlock-Machinery, Toronto.

Grand Machine & Tool Co., Philadelphia, Pa.

A. B. Jardine & Co., Hespeler, Ont.

Rockford Machine Tool Co., Rockford, Ill.

R. McDougall Co., Galt.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.

**Drilling Posts.**

Keystone Mfg. Co., Buffalo, N.Y.

**Drills, Bench.**

W. F. & John Barnes Co., Rockford, Can.

Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Pratt & Whitney Co., Dundas, Ont.

United States Electrical Tool Co., Cincinnati.

**Drills, Blacksmith and Bit Stock.**

Can. Buffalo Forge Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

A. B. Jardine & Co., Hespeler, Ont.

Morse Twist Drill and Machine Co., New Bedford.

H. W. Petrie, Toronto.  
 Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drills, Centre.**

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill and Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

L. S. Starrett Co., Athol, Mass.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drills (Corner) (Pneumatic).**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Drills, Electric and Portable.**

A. R. Williams Machy. Co., Toronto.

Can. Buffalo Forge Co., Montreal.

Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.

Stow Mfg. Co., Binghamton, N.Y.

United States Electrical Tool Co., Cincinnati, O.

**Drills, High Speed.**

Baker Bros., Toledo, O.

Cleveland Twist Drill Co., Cleveland.

Can. Fairbanks-Morse Co., Montreal.

H. W. Petrie, Montreal.

Morse Twist Drill and Machine Co., New Bedford.

W. F. & John Barnes Co., Rockford, Ill.

McKenna Bros. Brass Co., Pittsburg, Pa.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Whitman & Barnes Mfg. Co., St. Catharines, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drills, Multiple Spindle.**

Pratt & Whitney Co., Dundas, Ont.

Niles-Bement-Pond Co., New York.

**Drills, Oil Tube.**

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill and Machine Co., New Bedford.

**Drills, Pneumatic.**

John F. Allen Co., New York.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago, Ill.

Niles-Bement-Pond Co., New York.

**Drills, Ratchet and Hand.**

Armstrong Bros. Tool Co., Chicago.

Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

A. B. Jardine & Co., Hespeler, Ont.

Morse Twist Drill and Machine Co., New Bedford.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drills, Rock.**

A. R. Williams Machy. Co., Toronto.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Drills, Reamer.**

McKenna Bros. Brass Co., Pittsburg, Pa.

**Drills, Track.**

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill and Machine Co., New Bedford.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drills, Twist.**

Armstrong, Whitworth of Canada, Ltd., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

John Morrow Screw Co., Ingersoll, Ont.

Morse Twist Drill and Machine Co., New Bedford.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drill Holders.**

Wells Brothers Co., Greenfield, Mass.

**Drill Sockets.**

Modern Tool Co., Erie, Pa.

Morse Twist Drill and Machine Co., New Bedford.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Drinking Fountains.**

Puro Sanitary Drinking Fountain Co., Haverhill, Mass.

**Drying Appliances.**

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Sheldons, Ltd., Galt, Ont.

**Drying Out Barrels.**

Raid Machine Co., Bridgeport, Conn.

**Drying Ovens.**

Oven Equipment & Mfg. Co., New Haven, Conn.

Whiting Foundry Equipment Co., Haverhill, Mass.

**Dump Cars.**

Can. Fairbanks-Morse Co., Montreal.

National Machinery & Supply Co., Hamilton, Ont.

Owen Sound Iron Works Co., Owen Sound.

Plessisville Foundry, Plessisville, Que.

**Dust Separators.**

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

**Dust Arresters (for Tumbling Mills).**

Niles-Bement-Pond Co., New York.

Whiting Foundry Equipment Co., Haverhill, Mass.

**Dynamos and Electrical Supplies.**

A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.

Lancashire Dynamo and Motor Co., Ltd., Toronto.

H. W. Petrie, Toronto.

Toronto & Hamilton Electric Co., Hamilton, Ont.

**Electrical Supplies.**

Duncan Electrical Co., Montreal.

Lintz-Porter Co., Toronto.

**Elevator Enclosures.**

Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works, London, Ont.

**Elevating and Conveying Machinery.**

Can. Mathews Gravity Co., Toronto.

Plessisville Foundry, Plessisville, Que.

Emery Grinders (Pneumatic). Cleveland Pneumatic Tool Co. of Canada, Toronto.

Stow Mfg. Co., Binghamton, N.Y.

**Emery and Emery Wheels.**

Can. Fairbanks-Morse Co., Montreal.

Canadian Hart Wheels, Hamilton, Ont.

Ford-Smith Machine Co., Hamilton.

Garrin Machine Co., New York.

Grand Machine & Tool Co., Philadelphia, Pa.

H. W. Petrie, Toronto.

Stevens, F. B., Detroit, Mich.

**Emery Wheels, Dressers and Stands.**

Canadian Hart Wheels, Hamilton, Ont.

Gardner, Robt., & Son, Montreal.

General Supply Co. of Canada, Ltd., Ottawa.

National Machinery & Supply Co., Hamilton, Ont.

Norton Co., Worcester, Mass.

H. W. Petrie, Toronto.

**Emery Wheel Safety Flanges.**

Canadian Hart Wheels, Hamilton, Ont.

**Enameling Ovens.**

Oven Equipment & Mfg. Co., New Haven, Conn.

**Engines, Corliss, Compound, Pumping.**

Mesta Machine Co., Pittsburg, Pa.

Wm. Tod Company, Youngstown, O.

**Engines, Gas and Gasoline.**

Can. Fairbanks-Morse Co., Montreal.

Jones & Glasco, Montreal.

Mesta Machine Co., Pittsburg, Pa.

National Machinery & Supply Co., Hamilton.

H. W. Petrie, Toronto.

Wm. Tod Company, Youngstown, O.

**Engines, Horizontal and Vertical.**

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Mesta Machine Co., Pittsburg, Pa.

H. W. Petrie, Toronto.

Sheldons, Ltd., Galt, Ont.

A. R. Williams Machy. Co., Toronto.

Wm. Tod Co., Youngstown, O.

**Engines, High-Speed, Automatic.**

Can. Buffalo Forge Co., Montreal.

**Engines, Steam.**

Can. Buffalo Forge Co., Montreal.

General Supply Co. of Canada, Ltd., Ottawa.

Mesta Machine Co., Pittsburg, Pa.

H. W. Petrie, Toronto.

Plessisville Foundry, Plessisville, Que.

Southwick Foundry & Machine Co., Philadelphia, Pa.

Wm. Tod Company, Youngstown, O.

**Engines, Stationary and Marine.**

Southwick Foundry & Machine Co., Philadelphia, Pa.

**Engineering Books.**

The Maclean Publishing Co., Ltd., Toronto.

**Engraving Machines.**

Geo. Gorton Machine Co., Racine, Wis.

**Elevators and Buckets.**

Eastern Machinery Co., New Haven, Conn.

Whiting Foundry Equipment Co., Haverhill, Mass.

**Exhaust Steam.**

Raid Machine Co., Bridgeport, Conn.

Garrin Machine Co., New York.



## For Rapid Production and Accurate Work

### USE THE "BRIGGS"

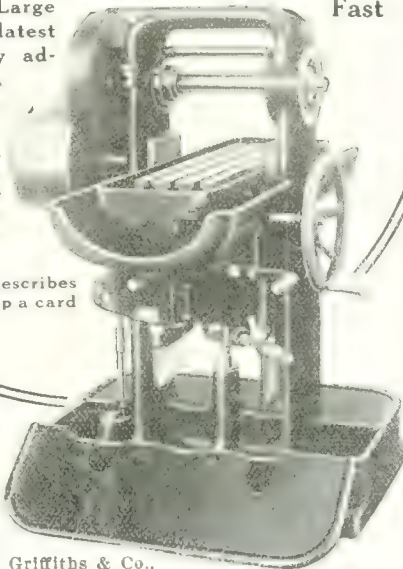
The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speeds.

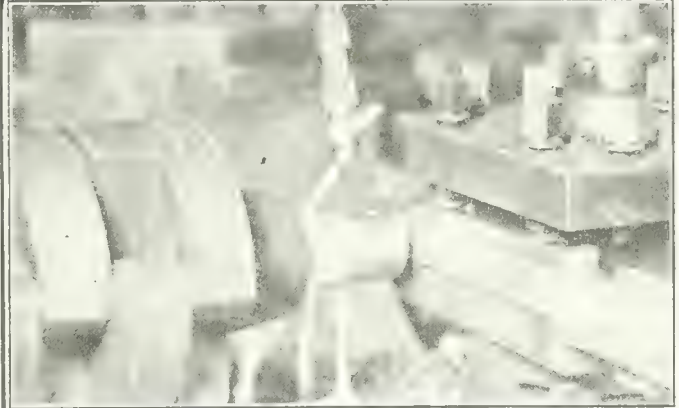
Our booklet describes fully. Drop a card for it.

Fast



**Gooley & Edlund**  
Inc.  
Cortland, U.S.A.

Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia. C. W. Burton, Griffiths & Co., London, Manchester and Glasgow. Barandaran, Metivier, Gazeau & Cia, San Sebastian, Spain.



## ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING. Every description of work and grade run just, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% IN THE COST OF YOUR CUTTING MIXTURE BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with 30 to 50 gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be satisfactory, but will produce VERY ECONOMIC RESULTS.

Our TRIAL ORDER will prove our STATEMENT.

*Made in Canada*

**Canadian Economic Lubricant Co.**  
LIMITED

1040-1042 Durocher St.

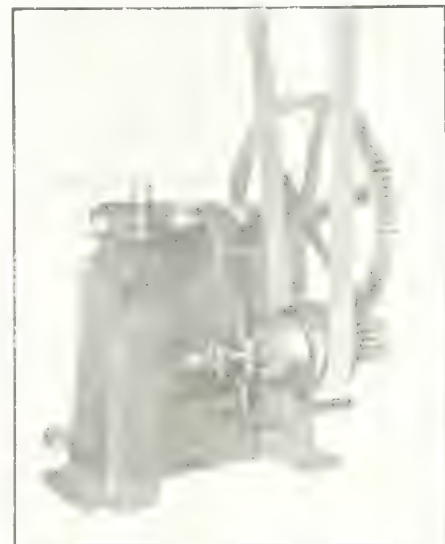
MONTREAL

## Holden-Morgan Mechanical Plug Wrench

*For Screwing the Base Plugs Into Shells*

Output 120 per hour. One machine with an operator will do the work of four men. Friction device adjustable, and can be set for any required tension, and when set the pressure applied will not vary from the desired adjustment.

Direct driven, no countershaft needed. The plug is screwed in and tightened up entirely by mechanical action, and therefore eliminating the variations that result from hand work.



**THE HOLDEN-MORGAN COMPANY, LIMITED**

539 RICHMOND STREET WEST, TORONTO

**Furnaces, Heat Treating, Hardening and Tempering.**

Can. Hoskins, Ltd., Walkerville, Ont.  
Chicago Flexible Shaft Co., Chicago, Ill.  
Mechanical Engineering Co., 55 Cote St., Montreal, Que.  
N. W. P. Tool Co., Toronto, Ont.

Tate, Jones & Co., Pittsburgh, Pa.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Furnaces, Forging.**

Mechanical Engineering Co., Montreal, Que.  
N. W. P. Tool Co., Toronto, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

**Furnaces, Annealing, etc.**

Can. Hoskins, Ltd., Walkerville, Ont.  
Chicago Flexible Shaft Co., Chicago, Ill.

Mechanical Engineering Co., 55 Cote St., Montreal, Que.  
N. W. P. Tool Co., Toronto, Ont.

Tate, Jones & Co., Pittsburgh, Pa.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Furnaces for Baking, Bluing, Drying, Enameling, Japanning and Lacquering.**

Mechanical Engineering Co., Montreal, Que.  
Oven Equipment & Mfg. Co., New Haven, Conn.

**Furnace Lining.**

Can. H. W. Johns-Manville Co., Limited, Toronto.  
Mechanical Engineering Co., Montreal.

**Fuse Cap Machinery.**

Noble & Westbrook Mfg. Co., Hartford, Conn.

**Gang Planer Tools.**

Armstrong Bros. Tool Co., Chicago.

**Gaskets, Leather, etc.**

Graton & Knight Mfg. Co., Montreal.  
Can. H. W. Johns-Manville Co., Limited, Toronto.

**Gas Blowers and Exhausters.**

Can. Buffalo Forge Co., Montreal.  
Can. Sirocco Co., Ltd., Windsor, Ont.  
Sheldons, Limited, Galt.

**Gas Burners.**

Oven Equipment & Mfg. Co., New Haven, Conn.

**Gas Machines.**

Brown, Boggs & Co., Hamilton Can. Gas Producer Plants.

**Gauges, Hydraulic Pressure.**

Charles F. Elmes Eng. Works, Chicago  
Watson Stillman Co., Aldene, N.J.

**Gauges, Standard.**

Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland, Ohio.  
Greenfield Tap & Die Corporation, Greenfield, Mass.

Holden-Morgan Co., Toronto.  
Morse Twist Drill and Machine Co., New Bedford.

Pratt & Whitney Co., Hartford, Conn.  
Garvin Machine Co., New York.  
National Machinery & Supply Co., Hamilton.

Southwark Foundry & Machine Co., Philadelphia.

**Gear-Cutting Machinery.**

Grand Machine & Tool Co., Philadelphia, Pa.  
Hamilton Gear & Machine Co., Toronto.

Hill, Clarke & Co., of Chicago, Chicago, Ill.  
Mote & Merryweather Machy. Co., Cleveland, O.

National Machinery & Supply Co., Hamilton.  
H. W. P. Tool Co., Toronto.

Sheldons, Limited, Galt, Ont.  
The Smart-Turner Machine Co., Hamilton.

Wm. Tod Co., Youngstown, O.  
D. E. Whiton Machine Co., New London, Conn.

A. R. Williams Machy. Co., Toronto.

**Gears, Cut, Mortise, Angle, Worm.**

Gardner, Robt., & Son, Montreal.  
Hamilton Gear & Machine Co., Toronto.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Jones & Glasco, Montreal, P.Q.  
Mesta Machine Co., Pittsburgh, Pa.  
Philadelphia Gear Works, Philadelphia, Pa.  
Smart-Turner Machine Co., Hamilton, Ont.  
Wm. Tod Co., Youngstown, O.

Gears, Rawhide.  
Hamilton Gear & Machine Co., Toronto.  
Gardner, Robt., & Son, Montreal.  
Jones & Glasco, Montreal, P.Q.  
Philadelphia Gear Works, Philadelphia, Pa.  
Smart-Turner Machine Co., Hamilton, Ont.

**Generators, Electric.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Lancashire Dynamo and Motor Co., Ltd., Toronto.

H. W. P. Tool Co., Toronto.  
Toronto and Hamilton Electric Co., Hamilton.

Grain for Polishing.  
Norton Co., Worcester, Mass.

Graphite.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Jos. Dixon Crucible Co., Jersey City, Stevens, F. B., Detroit, Mich.

Grinders, Automatic Knife.  
W. H. Banfield & Son, Toronto.

Grinders, Centre, Pedestal and Bench.  
Canadian Hart Wheels, Ltd., Hamilton, Ont.

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Ford-Smith Machine Co., Hamilton.

Foss & Hill Machy. Co., Montreal.  
Gray Mfg. & Machine Co., Toronto.

Niles-Bement-Pond Co., New York.  
Modern Tool Co., Erie, Pa.

Morse Twist Drill and Machine Co., New Bedford.  
New Britain Machine Co., New Britain, Conn.

Norton Grinding Co., Worcester, Mass.  
H. W. P. Tool Co., Toronto.

Stow Mfg. Co., Binghamton, N.Y.  
United States Electrical Tool Co., Cincinnati, O.

Grinders, Cutter.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Foss & Hill Machy. Co., Montreal.  
Greenfield Machine Co., Greenfield, Mass.

H. W. P. Tool Co., Toronto.  
Pratt & Whitney Co., Dundas, Ont.

Grinders, Die Chaser.  
Bignall & Kesler Mfg. Co., Edwardsville, Ill.

Landis Machine Co., Waynesboro, Pa.  
Modern Tool Co., Erie, Pa.

Grinders, Disk.  
Armstrong Bros. Tool Co., Chicago, Ill.

Gardner Machine Co., Beloit, Wis.  
Norton Grinding Co., Worcester, Mass.

Grinders, Drill.  
Garvin Machine Co., New York.  
United States Electric Tool Co., Cincinnati, O.

Grinders, Cylinder, Internal.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Foss & Hill Machy. Co., Montreal.  
Grand Machine & Tool Co., Philadelphia, Pa.

Grant Mfg. & Machine Co., Bridgeport, Conn.  
Greenfield Machine Co., Greenfield, Mass.

Hill, Clarke & Co., of Chicago, Chicago, Ill.  
Landis Tool Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.  
Mote & Merryweather Machy. Co., Cleveland, O.

Norton Grinding Co., Worcester, Mass.  
H. W. P. Tool Co., Toronto.

Grinders, Electric.  
Lutz-Porter Co., Toronto.

Grinders, Pneumatic.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago, Ill.

Grinders, Portable, Electric.  
Hand, Tool, Post, Floor and Bench.

Baird Machine Co., Bridgeport, Conn.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Foss & Hill Machy. Co., Montreal.  
Grant Mfg. & Machine Co., Bridgeport, Conn.

Greenfield Machine Co., Greenfield, Mass.  
Hill, Clarke & Co., of Chicago, Chicago, Ill.

Landis Tool Co., Waynesboro, Pa.  
Mote & Merryweather Machy. Co., Cleveland, O.

Norton Co., Worcester, Mass.  
H. W. P. Tool Co., Toronto.

United States Electrical Tool Co., Cincinnati.

A. R. Williams Machy. Co., Toronto.

Grinders, Swing, Portable, Electric.  
United States Electrical Tool Co., Cincinnati.

Grinders, Tool and Holders.  
Armstrong Bros. Tool Co., Chicago.

W. F. & John Barnes Co., Rockford, Ill.

Blount, J. G., & Co., Everett, Mass.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Greenfield Machine Co., Greenfield, Mass.  
Hill, Clarke & Co., of Chicago, Chicago, Ill.

Mote & Merryweather Machy. Co., Cleveland, O.  
Tabor Mfg. Co., Philadelphia, Pa.

**Grinders, Universal, Plain.**

Grand Machine & Tool Co., Philadelphia, Pa.  
Landis Tool Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

Grinders, Vertical Surface.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.  
Grand Machine & Tool Co., Philadelphia, Pa.

Pratt & Whitney Co., Dundas, Ont.

Grinding and Polishing Machines, Portable, Pneumatic and Spring Frame.

Can. Fairbanks-Morse Co., Montreal.  
Canadian Hart Wheels, Ltd., Hamilton, Ont.

Gardner, Robt., & Son, Montreal.  
Garvin Machine Co., New York.

Grand Machine & Tool Co., Philadelphia, Pa.  
Gray Mfg. & Machine Co., Toronto.

Greenfield Machine Co., Greenfield, Mass.  
Hall & Sons, John H., Brantford, Ill.

Hill, Clarke & Co. of Chicago, Chicago, Ill.  
Mote & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.  
Norton Co., Worcester, Mass.

H. W. P. Tool Co., Toronto.  
Stow Mfg. Co., Binghamton, N.Y.

Grinding Wheels.  
Can. Fairbanks-Morse Co., Montreal.

Canadian Hart Wheels, Ltd., Hamilton, Ont.  
Carborundum Co., Niagara Falls, Canada.

Ford-Smith Machine Co., Hamilton, Canada.  
Gray Mfg. & Machine Co., Toronto.

Norton Co., Worcester, Mass.  
H. W. P. Tool Co., Toronto.

Guards, Window and Machine.  
Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

Hack Saw Blades.  
E. C. Atkins & Co., Hamilton, Ont.

Victor Saw Works, Ltd., Hamilton, Canada.  
Diamond Saw & Stamping Works, Buffalo, N.Y.

Racine Tool & Machine Co., Racine, Wis.  
L. S. Starrett Co., Athol, Mass.

Hack Saw Frames.  
Ford-Smith Machine Co., Hamilton, Canada.

Garvin Machine Co., New York City.

Hammer High Speed.  
High Speed Hammer Co., Rochester, N.Y.

Hammers, Drop and Belt Driven.  
Bliss, E. W., Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.  
Canadian Billings & Spencer, Ltd., Welland.

A. B. Jardine & Co., Hespeler, Ont.  
Grand Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.  
Niles-Bement-Pond Co., New York.

Plessisville Foundry, Plessisville, Que.  
Toledo Machine & Tool Co., Toledo, Ohio.

Hammers, Helve Power.  
West Tire Setter Co., Rochester, N.Y.

Hammers, Pneumatic.  
Cleveland Pneumatic Tool Co., of Canada, Toronto.

Hammers, Steam.  
John Bertram & Sons Co., Dundas.

Grand Machine & Tool Co., Philadelphia, Pa.  
National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Hand Hoists & Trolleys.  
Whiting Foundry Equipment Co., Harvey, Ill.

Hand Leathers or Pads.  
Graton & Knight Mfg. Co., Montreal.

Hangers.  
Baird Machine Co., Bridgeport, Conn.

Gardner, Robt., & Son, Montreal.  
General Supply Co. of Canada, Ltd., Montreal.

H. W. P. Tool Co., Toronto.  
The Smart-Turner Machine Co., Hamilton.

Hardness Testing Instruments.  
Shore Instrument & Mfg. Co., New York.

Heating and Ventilating Engineers.  
Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.  
Sheldons, Ltd., Galt, Ont.

Heat Gauges, Hardening and Annealing.  
Shore Instrument & Mfg. Co., New York.

Hide.  
L. S. Starrett & Son, Montreal.

**Hinge Machinery.**

Baird Machine Co., Bridgeport, Conn.

Hinges.  
London Bolt & Hinge Works, London, Ont.

Hoists, Hydraulic.  
Southwark Foundry & Machine Co., Philadelphia.

Watson-Stillman Co., Aldene, N.J.

Hoisting and Conveying Machinery.  
Baith, W. D., & Son, Toronto.

General Supply Co. of Canada, Ltd., Ottawa.

Northern Crane Works, Walkerville.  
Owen Sound Iron Works Co., Owen Sound.

Southwark Foundry & Machine Co., Philadelphia.  
Whiting Foundry Equipment Co., Harvey, Ill.

Hoists, Chain, Electric and Pneumatic.  
Northern Crane Works, Walkerville.

Whiting Foundry Equipment Co., Harvey, Ill.

Hoists, Electric.  
Northern Crane Works, Walkerville.

Whiting Foundry Equipment Co., Harvey, Ill.

Hoppers.  
Toronto Iron Works, Ltd., Toronto.

Hose Clamp Tool.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Hose, Pneumatic.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Hose, Steam, Suction and Water.  
Can. H. W. Johns-Manville Co., Limited, Toronto.

Holders for Dies and Drills.  
Wells Brothers, Company, Greenfield, Mass.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Horsehair.  
L. S. Starrett & Sons, Montreal.

Hydraulic Accumulators.  
Can. Boomer & Boschert Press Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.  
Mesta Machine Co., Pittsburgh.

Niles-Bement-Pond Co., New York.  
William R. Perrin, Ltd., Toronto.

The Smart-Turner Machine Co., Hamilton.  
Southwark Foundry & Machine Co., Philadelphia.

Watson-Stillman Co., Aldene, N.J.

Hydraulic Machinery.  
Can. Boomer & Boschert Press Co., Montreal.

Charles F. Elmes Eng. Works, Chicago.  
Mesta Machine Co., Pittsburgh.

Niles-Bement-Pond Co., New York.  
National Machinery & Supply Co., Hamilton.

William R. Perrin, Ltd., Toronto.  
H. W. P. Tool Co., Toronto.

Southwark Foundry & Machine Co., Philadelphia.  
Wm. Tod Co., Youngstown, O.

Watson-Stillman Co., Aldene, N.J.  
Wm. R. D. & Co., Philadelphia.

Indicators, Speed.  
Brown & Sharpe Mfg. Co., Providence, R.I.

L. S. Starrett Co., Athol, Mass.

Index Centres.  
Fred. C. Dickow, Chicago, Ill.

Garvin Machine Co., New York.

Ingot Metals.  
A. C. Leslie & Co., Ltd., Montreal.

Intensifiers.  
Mesta Machine Co., Pittsburgh, Pa.

Southwark Foundry & Machine Co., Philadelphia.

Iron Filler.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Iron Ore.  
Hanna & Co., M. A., Cleveland, O.

Jacks, Hydraulic.  
Charles F. Elmes Eng. Works, Chicago.

Southwark Foundry & Machine Co., Philadelphia.  
Watson-Stillman Co., Aldene, N.J.

Jacks.  
Can. Fairbanks-Morse Co., Montreal.

Northern Crane Works, Walkerville.

Norton, A. O., Coaticook, Que.

H. W. P. Tool Co., Toronto.

Plessisville Foundry, Plessisville, Que.

Jacks, Pneumatic.  
Northern Crane Works, Walkerville.

Jacks, Pit and Track.  
Can. Fairbanks-Morse Co., Montreal.

Northern Crane Works, Walkerville.

Watson-Stillman Co., Aldene, N.J.

Japanning Ovens.  
Oven Equipment & Mfg. Co., New Haven, Conn.

Jaws, Face Plate.  
Cushman Chuck Co., Hartford, Conn.

Skinner Chuck Co., New Britain, Conn.



*We are Headquarters for:*

**Shell Marking Machines  
Nosing Presses  
Stamping Presses  
Drop Hammers  
Sheet Metal Workers' Tools**

**The Brown, Boggs Company, Limited, Hamilton, Canada**

**Tinsmiths' Tools, Sheet Metal Working Machinery, etc.**

**WESTERN AGENTS: Messrs. Bissett & Webb, Limited, Winnipeg and Edmonton**

**Tool Slides and Spindles  
are always in perfect alignment  
on**

**Gridley Automatics**

The Tools simply cannot get out of alignment with the spindles because the tool slide is mounted on an extension of the spindle carrier.

The other end of this Spindle Carrier, Carriers could run, and the tool slides and spindles would not be disturbed. Gridley Automatics are just as accurate after ten or twenty years of use as when new.

Every operator, on these modern machines, can make a considerable saving in time and labor. If more than that, the operator can use tools tandem when rapid production is necessary. When you are forced to get work out in a hurry, remember that with "Gridley" Automatics your operator can often do at **one** operation, the same work that would require **two** or **more** operations on all other machines. In fact, you can frequently double or treble your output.



"GRIDLEY" SINGLE SPINDLE

**Windsor Machine Co., Windsor, Vt., U.S.A.**

**Canadian Office, 1501 Royal Bank Building, Toronto  
E. C. Roelofson, Manager**

YOU WILL PROBABLY BE  
INTERESTED TO KNOW  
THAT WE HAVE IN STOCK  
ALL THE FOLLOWING  
MACHINES: SHEET METAL  
PRESSES, STAMPING  
PRESSES, DROP HAMMERS,  
SINGLE AND DOUBLE  
SPINDLE AUTOMATICS,  
ETC.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

**Jigs, Tools, etc.**

Hamilton Gear & Machine Co., Toronto.

**Key Seaters.**

Baker Bros., Toledo, O.  
Garvin Machine Co., New York.  
Morton Mfg. Co., Muskegon Heights, Mich.

A. R. Williams Machy. Co., Toronto.

**Kilns.**

Can. Buffalo Forge Co., Montreal.  
Sheldons, Limited, Galt, Ont.

**Laboratories, Inspection and Testing.**  
Can. Inspection & Testing Laboratories, Ltd., Montreal.

**Lacquering Ovens.**

Oven Equipment & Mfg. Co., New Haven, Conn.

**Ladies, Foundry.**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Lag Screw (Gimlet) Pointers.**  
National Machy. Co., Tiffin, Ohio.

**Lamps, Arc and Incandescent.**  
Can. Fairbanks-Morse Co., Montreal.  
Can. H. W. Johns-Manville Co., Ltd., Red, Toronto.

Ker & Goodwin, Brantford.

**Lamps, Tungsten.**  
Lintz-Porter Co., Toronto.

**Lathe Chucks.**  
Ker & Goodwin, Brantford.

**Lathe Attachment for Shells.**  
Lymburner, Ltd., Montreal.

**Lathe, Automatic.**  
Windsor Machine Co., Windsor, Vt.

**Lathe Dogs and Attachments.**  
Armstrong Bros. Tool Co., Chicago.  
Far & Scott, Dexter, Maine.

Hendey Machine Co., Torrington, Conn.  
National Forge & Tool Co., Erie, Pa.

J. H. Williams Co., Brooklyn, N.Y.

**Lathe, Bench.**  
W. F. & John Barnes Co., Rockford, Blount, J. G. & Co., Everett, Mass.  
Can. Fairbanks-Morse Co., Montreal.  
Pratt & Whitney Co., Dundas, Ont.

**Lathe, Band Turning.**  
Jencks Machine Co., Sherbrooke, Que.

**Lathe, Engine.**  
Amalgamated Machy. Corporation, Chicago, Ill.

A. R. Williams Machy. Co., Toronto.  
W. F. & John Barnes Co., Rockford, Ill.

John Bertram & Sons Co., Dundas, Can. Fairbanks-Morse Co., Montreal.  
Cincinnati Iron & Steel Co., Cincinnati, O.

Fay & Scott, Dexter, Maine.  
Garner Robt. & Son, Montreal.  
Garlock-Machinery, Toronto.

Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

Hendey Machine Co., Torrington, Conn.

Hill, Clarke & Co., of Chicago, Inc., Chicago, Ill.

R. McDougall Co., Galt.  
Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.  
Oliver Machinery Co., Grand Rapids, Mich.

H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.

**Lathe Pans.**  
New Britain Machine Co., New Britain, Conn.

**Lathe, Patternmakers.**  
J. O. Blount Co., Everett, Mass.  
Fay & Scott, Dexter, Maine.

Foss & Hill Machy. Co., Montreal.  
Garlock-Machinery, Toronto.  
H. W. Petrie, Toronto.

**Lathe, Roll Turning.**  
Mesta Machine Co., Pittsburgh.

A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas, Cincinnati Iron & Steel Co., Cincinnati, O.

Girard Machine & Tool Co., Philadelphia, Pa.  
Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.  
H. W. Petrie, Toronto.

**Lathe, Spinning.**  
Bliss E. W. Co., Brooklyn, N.Y.  
Toledo Mach. & Tool Co., Toledo, O.

**Lathe, Turret and Speed.**  
John Bertram & Sons Co., Dundas, Blount, J. G. & Co., Everett, Mass.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.  
Canada Machinery Corp., Galt, Ont.  
Cincinnati Iron & Steel Co., Cincinnati, O.

Colburn Machine Tool Co., Franklin, Pa.

Fay & Scott, Dexter, Maine.  
Foss & Hill Machy. Co., Montreal.  
Garlock-Machinery, Toronto.

Garvin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

New Britain Machine Co., New Britain, Conn.  
Niles-Bement-Pond Co., New York.  
Oliver Machinery Co., Grand Rapids, Mich.

H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Warner & Swasey Co., Cleveland, O.

Windsor Machine Co., Windsor, Vt.  
A. R. Williams Machy. Co., Toronto.

**Leather Strapping.**  
Graton & Knight Mfg. Co., Montreal.

**Lifts, Pneumatic.**  
Whiting Foundry Equipment Co., Harvey, Ill.

**Lighting Fixtures.**  
Lintz-Porter Co., Toronto.

**Link Belting.**  
Can. Fairbanks-Morse Co., Montreal.  
Graton & Knight Mfg. Co., Montreal.  
Jones & Glasco, Montreal.

**Linoleum Mill Machinery.**  
Bertrams, Ltd., Edinburgh, Scotland.

**Liquid Air.**  
L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

**Lockers, Steel Wardrobe and Steel Material.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

**Lockers.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

**Locomotive Equipment.**  
Can. Locomotive Co., Kingston, Ont.

**Locomotives, Railroad.**  
Contracting.  
Can. Locomotive Co., Kingston, Ont.

National Machinery & Supply Co., Hamilton.

**Lubricants.**  
S. F. Rowser & Co., Fort Wayne, Ind.  
Can. Economic Lubricant Co., Montreal.

Can. Oil Company, Toronto.  
Catact Refining Co., Toronto.  
Crescent Oil Co., Inc., New York.

**Machine Tools.**  
Amalgamated Machy. Corporation, Chicago, Ill.

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.  
Can. Machinery Corp., Galt, Ont.  
Garlock-Machinery, Toronto.

General Supply Co. of Canada, Ltd., Ottawa.

Modern Tool Co., Erie, Pa.  
Niles-Bement-Pond Co., New York.  
H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.  
J. H. Williams Co., Brooklyn, N.Y.

**Machinery Dealers.**  
Can. Fairbanks-Morse Co., Montreal.  
Garlock-Machinery, Toronto.

Hill, Clarke & Co., of Chicago.  
Marshall & Hueschart Machinery Co., Chicago.

National Machinery & Supply Co., Hamilton.

New York Machinery Exchange, New York.

H. W. Petrie, Toronto.  
A. R. Williams Machy. Co., Toronto.

**Machinery Guards.**  
Jones & Glasco, Montreal, P.Q.

Canada Wire & Iron Goods Co., Hamilton, Ont.

A. R. Williams Machy. Co., Toronto.

**Machinery Repairs.**  
Cunningham & Sons, St. Catharines, Ont.

Pleasantville Foundry, Pleasantville, Que.

**Machinists' Scales, Small Tools and Supplies.**  
Can. Fairbanks-Morse Co., Montreal.

Frank H. Scott, Montreal.  
J. H. Williams & Co., Brooklyn, N.Y.

**Magnetos.**  
Lintz-Porter Co., Toronto.

**Mandrels.**  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.

A. B. Jardine & Co., Hespeler, Ont.  
Moses Twist Drill and Machine Co., New Bedford.

H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
WBT Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Marine Engines.**  
Cunningham & Sons, St. Catharines, Ont.

**Marking Machinery.**  
Brown, Rogers Co., Hamilton, Ont.

Noble & Westbrook Mfg. Co., Hartford, Conn.

**Magnets.**  
Dennis Wire & Iron Works, London, Ont.

**Measuring Tapes and Rules.**  
James Chesterman & Co., Ltd., Sheffield, Eng.

**Metallogists.**  
Can. Inspection & Testing Laboratories, Ltd., Montreal.

**Toronto Testing Laboratory, Ltd., Toronto.**

**Metals.**

C. S. Tarshis & Sons, Montreal.

**Metal Cutting Machines.**

Hurlbut, Rogers Machinery Co., South Haverhill, Mass.

Rachne Tool & Machine Co., Racine, Wis.

**Metal Stamping.**

Duncan Electrical Co., Montreal.

**Meters, Electrical.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.

Lintz-Porter Co., Toronto.

**Mill Machinery.**

Cunningham & Sons, St. Catharines, Ont.

Alexander Fleck, Ltd., Ottawa.

**Milling Attachments.**  
John Bertram & Sons Co., Dundas.

Brown & Sharpe Mfg. Co., Providence.  
Cincinnati Milling Machine Co., Cincinnati, Ohio.

Hendey Mach Co., Torrington, Conn.  
Kemp Smith Mfg. Co., Milwaukee, W.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.  
Rockford Milling Machine Co., Rockford, Ill.

**Milling Machines, Horizontal and Vertical.**  
A. R. Williams Machy. Co., Toronto.

Brown & Sharpe Mfg. Co., Providence, R.I.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

John Bertram & Sons Co., Dundas.

Foss & Hill Machy. Co., Montreal.  
Gosley & Edmund, Cortland, N.Y.

Hill, Clarke & Co., of Chicago, Chicago, Ill.

Hendey Machine Co., Torrington.

Kemp Smith Mfg. Co., Milwaukee, Wis.  
Mesta Machine Co., Pittsburgh, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.  
H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.  
Rockford Milling Machine Co., Rockford, Ill.

A. R. Williams Machy. Co., Toronto.

**Milling Machines, Profile.**  
Brown & Sharpe Mfg. Co., Providence.

Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.

Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

Mesta Machine Co., Pittsburgh, Pa.  
Motch & Merryweather Machy. Co., Cleveland, O.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

**Milling Tools.**  
Brown & Sharpe Mfg. Co., Providence.

Geometric Tool Co., New Haven, Conn.  
Kemp Smith Mfg. Co., Milwaukee, W.

**Mine Cars and Hitches.**  
Can. Fairbanks-Morse Co., Montreal.

MacKinnon, Holmes Co., Sherbrooke, Que.

Modern Tool Co., Erie, Pa.

Pratt & Whitney Co., Dundas, Ont.

**Mining Machinery.**  
A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.  
Cleveland Pneumatic Tool Co., of Canada, Toronto.

H. W. Petrie, Toronto.

Toronto & Hamilton Electric Co., Hamilton, Ont.

**Mixers, Hot Metal.**  
Mesta Machine Co., Pittsburgh, Pa.

**Mortising Machines.**  
Jones & Glasco, Montreal.

**Motors, Electric.**  
A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.

Lancashire Dynamo & Motor Co., Ltd., Toronto.

Lintz-Porter Co., Toronto.

Toronto & Hamilton Electric Co., Hamilton, Ont.

**Motors, Pneumatic.**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago.

**Multiple Index Centres.**  
Garvin Machine Co., New York.

**Nipple Threading Machines.**  
John H. Hall & Sons, Ltd., Brantford, Ont.

**Landis Machine Co., Waynesboro, Pa.**

**Nitrogen.**  
L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

Nozzles, Spray.

Can. Buffalo Forge Co., Montreal.

Nuts, Semi-Finish and Finished.

Galt Machine Screw Co., Galt, Ont.

Steel Co. of Canada, Hamilton, Ont.

**Nut Burring Machines.**

National Machy. Co., Tiffin, O.

National Mach. & Sup. Co., Hamilton

**Nut Machines (Hot).**

National Machy. Co., Tiffin, O.

**Nut Facing and Bolt Shaving**

**Machines.**

Garvin Machine Co., New York.

National Machy. Co., Tiffin, O.

National Mach. & Sup. Co., Hamilton

**Nut Tappers.**

John Bertram & Sons Co., Dundas.

Garvin Machine Co., New York.

Greenfield Tap & Die Corporation.

Greenfield, Mass.

Hall, J. H., & Son, Brantford, Ont.

A. B. Jardine & Co., Hespeler.

Landis Machine Co., Waynesboro, Pa.

National Machy. Co., Tiffin, O.

National Mach. & Sup. Co., Hamilton

**Nut Wrenches.**

Wells Brothers Co., Greenfield, Mass.

**Oil Separators.**

Can. Fairbanks-Morse Co., Montreal.

Sheldons, Ltd., Galt, Ont.

Smart-Turner Machine Co., Hamilton.

**Oil Stones.**

Carborundum Co., Niagara Falls, N.Y.

Norton Co., Worcester, Mass.

**Ovens for Baking, Bluing, Drying, Enamelling, Japanning, and Lacquering.**

Geo. Gorton Machine Co., Racine, Wis.

Oven Equipment & Mfg. Co., New Haven, Conn.

Whiting Foundry Equipment Co., Harvey, Ill.

**Oven Trucks, Steel.**

Oven Equipment & Mfg. Co., New Haven, Conn.

**Ovens for Drying, Temper and Under Trucks.**

Oven Equipment & Mfg. Co., New Haven, Conn.

**Overhead Systems.**

W. D. Bath & Son, Toronto.

**Oscillating Valve Grinders (Pneumatic).**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Oxy-Acetylene Welding and Cutting Plants.**

L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

**Oxygen.**

L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

**Packings, Leather, Hydraulics, Etc.**

General Supply Co. of Canada, Ltd., Ottawa.

Graton & Knight Mfg. Co., Montreal.

William R. Perrin, Ltd., Toronto.

H. W. Petrie, Toronto.

Southward Foundry & Machine Co., Philadelphia.

**Packing, Rubber, etc.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.

**Pans, Lathe.**

Cleveland Wire Spring Co., Cleveland

**Pans, Steel Shop.**

Cleveland Wire Spring Co., Cleveland

**Paper Mill Machinery.**

Bertrams, Ltd., Edinburgh, Scotland.

Can. Sirocco Co., Ltd., Windsor, Ont.

**Partitions.**

Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

**Patent Solicitors.**

H. J. S. Dennison, Toronto.

Fetherstonhaugh & Co., Ottawa.

Marion & Marion, Montreal.

Ridout & Maybee, Toronto.



## A Lot of Holes Are Hidden Here

When you look at a freshly stored electric battery you can't see the energy in it but you know it's there. When you look at

## Cleveland Twist Drills

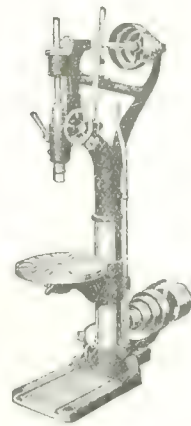
you know that accurate, clean holes through metal are available in the use of them. You can be sure of this because they hold the record. One of them drilled at the rate of  $57\frac{1}{2}$ " of metal per minute. They are made of scientifically selected and tested materials and with scientific heat treatment.

Ask us to mail you each month  
a copy of "Drill Chips."

**Cleveland Twist Drill Co.**  
New York. Cleveland. Chicago.

## The

# BARNES



# DRILLS



Complete line. 8-inch to 50-inch swing

**Gang Drills.—Horizontal Drills.**

SEND FOR CATALOG.

**W. F. & JOHN BARNES CO.**

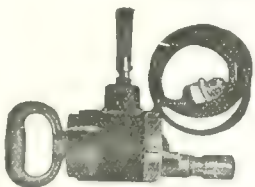
104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO  
Toronto, Winnipeg, Vancouver, and St. John, N.B.

WILLIAMS & WILSON, Montreal

## U. S. Electric Drills and Grinders

Save Time, Labor and Money



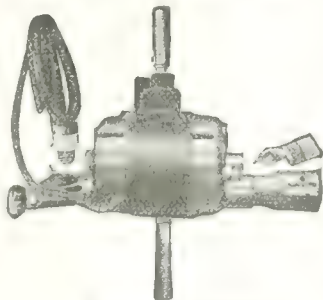
8 SIZES.  
3-16 inch, W.G.T. 6 lbs.  
1/4 inch, W.G.T. 9 lbs.  
3/8 inch, W.G.T. 12 lbs.

All motors wound for  
110 or 220 volts.  
Direct or alternating  
current.

Try a few of our  
Electric Drills and  
Grinders and you'll  
send us an order for  
more. Our guarantee  
protects you.

They can be at-  
tached to any lamp  
socket.

For drilling in metal  
they are superior to  
any other kind of  
portable drill. Cost  
50% less to run than  
air drills.



1/2 inch—2 SPEED.  
Speed, 400-750 R.P.M.

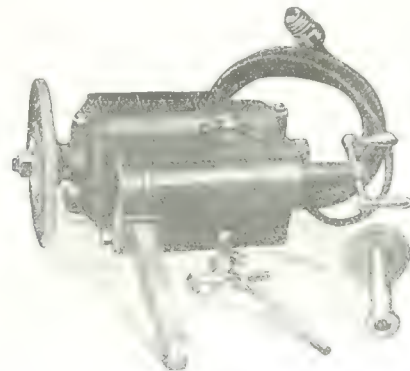
For Sale By  
**The Canadian Fairbanks-  
Morse Co., Limited**

Montreal. St. John, N.B., Toronto. Winnipeg. Calgary.  
Vancouver.

**THE UNITED STATES ELECTRICAL TOOL CO.**  
CINCINNATI, OHIO

## Stow Tool Post Grinder

Does the most accurate of work—pat-  
ent bearings, for Internal and Surface  
Grinding—A.C. or D.C. Immediate  
shipment from stock. Plain or with  
slide.



One of the many electric portable tools  
built by

**Stow Manufacturing Co.**

Binghamton, N.Y.

Oldest portable tool manufacturers in America.  
London Stock, 85 Queen Victoria St.



**Pipe Cutting and Threading Machines.**

A. R. Williams Machy. Co., Toronto.  
Armstrong Mfg. Co., Bridgeport, Conn.  
Bignall & Keeler Mfg. Co., Edwardsville, Ill.

Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Gardner Machine Co., New York.  
Grand Machine & Tool Co., Philadelphia, Pa.

John H. Hall & Sons, Brantford.  
A. B. Jardine & Co., Hespeler, Ont.  
Landis Machine Co., Waynesboro, Pa.  
R. McDougall Co., Galt.

Thomson Mfg. Co., Roxbury, Mass.  
Williams Tool Co., Erie, Pa.

**Pipe Cutters, Rolling.**

Armstrong Mfg. Co., Bridgeport, Conn.  
Bignall & Keeler Mfg. Co., Edwardsville, Ill.  
John H. Hall & Sons, Ltd., Brantford, Ont.

**Pipe Fittings.**

Southwark Foundry & Machine Co., Philadelphia, Pa.

**Pipe, Riveted Steel.**

Toronto Iron Works, Ltd., Toronto.

**Pipe Straightening Machines.**

Watson-Stillman Co., Aldene, N.J.

**Planer Drives, Electrical.**

Lancashire Dynamo & Motor Co., Ltd., Toronto.

**Planer Jacks.**

Armstrong Bros. Tool Co., Chicago.

**Planers, Standard and Rotary.**

John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.

Foss & Hill Machy. Co., Montreal.  
Gardner, Robt., & Son, Montreal.

Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

Morton Mfg. Co., Muskegon Heights, Mich.  
Niles-Bement-Pond Co., New York.

H. W. Perrin, Ltd., Toronto.

**Planing and Shaping Machinery.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.

Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.

Niles-Bement-Pond Co., New York.  
H. W. Perrin, Toronto.

**Planing Mill Exhausters.**

Can. Buffalo Forge Co., Montreal.  
Sheldons, Ltd., Galt, Ont.

**Pliers.**

Canadian Billings & Spencer, Ltd., Welland.

**Pneumatic Tools.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Curtis Pneumatic Machinery Co., St. Louis, Mo.

Independent Pneumatic Tool Co., Chicago, New York.

**Polishing Machines, Electric and Hand.**

Can. H. W. Johns-Manville Co., Toronto.

**Portable Vise Stands.**

New Britain Machine Co., New Britain, Conn.

**Portable Steel Tool Racks.**

New Britain Machine Co., New Britain, Conn.

**Portable Steel Work Stands.**

New Britain Machine Co., New Britain, Conn.

**Power Plant Equipments.**

Can. Fairbanks-Morse Co., Montreal.

**Power Transmission.**

Mesta Machine Co., Pittsburgh, Pa.  
The Smart-Turner Mach. Co., Hamilton.

**Press Screw (Adjustable).**

W. F. & John Barnes Co., Rockford.  
Wm. R. Perrin, Ltd., Toronto.

**Presses, Bench Straightening.**

Toledo Machine & Tool Co., Toledo.

**Presses for Shells.**

Can. Boomer & Boschert Press Co., Montreal.

Can. Locomotive Co., Kingston, Ont.  
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

Charles F. Elmes Eng. Works, Chicago.  
Foss & Hill Machy. Co., Montreal.

Gould & McCulloch Co., Galt, Ont.  
Mesta Machine Co., Pittsburgh, Pa.

William R. Perrin, Ltd., Toronto.  
H. W. Perrin, Toronto.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Can. Boomer & Boschert Press Co., Montreal.

Niles-Bement-Pond Co., New York.  
William R. Perrin, Ltd., Toronto.

Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.

**Presses, Filter.**

Lamburner, Ltd., Montreal.  
Wm. R. Perrin, Ltd., Toronto.

**Presses, Forging.**

Can. Boomer & Boschert Press Co., Montreal.

E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Roggs Co., Ltd., Hamilton.

Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

Charles F. Elmes Eng. Works, Chicago, Ill.

Can. Fairbanks-Morse Co., Montreal.  
Grand Machine & Tool Co., Philadelphia, Pa.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

Wm. R. Perrin, Ltd., Toronto.  
H. W. Perrin, Toronto.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Wm. Tool Co., Youngstown, O.  
Toledo Machine & Tool Co., Toledo.

Watson-Stillman Co., Aldene, N.J.

**Presses, Hydraulic.**

Can. Boomer & Boschert Press Co., Montreal.

Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas.

Charles F. Elmes Eng. Works, Chicago, Ill.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

William R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.

Wm. Tool Co., Youngstown, O.  
Toledo Machine & Tool Co., Toledo.

Watson-Stillman Co., Aldene, N.J.  
West, R. D. & Co., Philadelphia.

**Presses, Pneumatic.**

Toledo Machine & Tool Co., Toledo.

**Presses, Power.**

Baird Machine Co., Bridgeport, Conn.

Can. Boomer & Boschert Press Co., Montreal.

E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Roggs & Co., Hamilton.

Can. Fairbanks-Morse Co., Montreal.  
Charles F. Elmes Eng. Works, Chicago, Ill.

Geo. Gorton Machine Co., Racine.  
Girard Machine & Tool Co., Philadelphia, Pa.

William R. Perrin, Ltd., Toronto.  
H. W. Perrin, Toronto.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.

A. R. Williams Machy. Co., Toronto.

**Presses, Scrap Baling.**

Can. Boomer & Boschert Press Co., Montreal.

William R. Perrin, Ltd., Toronto.  
Watson-Stillman Co., Aldene, N.J.

**Presses, Spring Foot.**

Baird Machine Co., Bridgeport, Conn.

Toledo Machine & Tool Co., Toledo.

Brown, Roggs & Co., Hamilton, Can.

**Presses, Screw.**

Can. Boomer & Boschert Press Co., Montreal.

Wm. R. Perrin, Ltd., Toronto.

**Pressure Regulators.**

Can. Fairbanks-Morse Co., Montreal.

**Protective Paint.**

Jos. Dixon Crucible Co., Jersey City.

**Pulleys.**

American Pulley Co., Philadelphia, Pa.

Baird Machine Co., Bridgeport, Conn.

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.  
General Supply Co. of Canada, Ltd., Ottawa.

D. K. McLaren, Ltd., Montreal.  
H. W. Perrin, Toronto.

Positive Chutes & Pulley Works, Ltd., Toronto.

The Smart-Turner Mach. Co., Hamilton.

A. R. Williams Machy. Co., Toronto.

Pulley Machinery, Drilling and Tapping.

Can. Fairbanks-Morse Co., Montreal.  
Niles-Bement-Pond Co., New York.

Pumps, Air.

Mesta Machine Co., Pittsburgh, Pa.

Smart-Turner Mach. Co., Hamilton.

Pumps, High Pressure.

Charles F. Elmes Eng. Works, Chicago.

William R. Perrin, Ltd., Toronto.

Smart-Turner Mach. Co., Hamilton.

Southwark Foundry & Machine Co., Philadelphia.

Watson-Stillman Co., Aldene, N.J.

Pumping Machinery.

A. R. Williams Machy. Co., Toronto.

Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Darling Brothers, Montreal.

D'Olier Centrifugal Pump & Mach. Co., Philadelphia, Pa.

National Mach. & Sup. Co., Hamilton.

Wm. R. Perrin Co., Toronto.

H. W. Perrin, Toronto.

The Smart-Turner Mach. Co., Hamilton.

Southwark Foundry & Machine Co., Philadelphia.

Wm. Tool Company, Youngstown, O.

**Pumps, All Kinds.**

Can. Buffalo Forge Co., Montreal.

Charles F. Elmes Eng. Works, Chicago.

Darling Brothers, Montreal.

General Supply Co. of Canada, Ltd., Ottawa.

Owen Sound Iron Works Co., Owen Sound.

William R. Perrin, Ltd., Toronto.

H. W. Perrin, Toronto.

The Smart-Turner Mach. Co., Hamilton.

A. R. Williams Machy. Co., Toronto.

Watson-Stillman Co., Aldene, N.J.

**Pumps, Electrically Driven.**

D'Olier Centrifugal Pump & Mach. Co., Philadelphia, Pa.

The Smart-Turner Mach. Co., Hamilton.

**Pumps, Hydraulic.**

Can. Boomer & Boschert Press Co., Montreal.

Charles F. Elmes Eng. Works, Chicago, Ill.

Darling Brothers, Montreal.

Smart-Turner Mach. Co., Hamilton.

Southwark Foundry & Machine Co., Philadelphia.

Wm. R. Perrin, Ltd., Toronto.

Wm. Tool Co., Youngstown, O.

Watson-Stillman Co., Aldene, N.J.

**Pumps for Oiling Systems.**

S. F. Bowser & Co., Fort Wayne, Ind.

**Pumps, Steam.**

Darling Brothers, Montreal.

Smart-Turner Mach. Co., Hamilton.

Wm. Tool Company, Youngstown, O.

**Pump Leathers.**

Graton & Knight Mfg. Co., Montreal.

Southwark Foundry & Machine Co., Philadelphia.

**Punches and Dies.**

W. H. Banfield & Sons, Toronto.

E. W. Bliss Co., Brooklyn, N.Y.

Brown, Roggs Co., Ltd., Hamilton.

Canada.

Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Scott Bros., Halifax, Eng.

Gardner, Robt., & Son, Montreal.

Globe Machine & Stamping Co.

A. B. Jardine & Co., Hespeler, Ont.

H. W. Perrin, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Toledo Machine & Tool Co., Toledo, O.

**Punches, Power.**

John Bertram & Sons Co., Dundas.

Bliss, E. W. Co., Brooklyn, N.Y.

Brown, Roggs Co., Ltd., Hamilton.

Canada.

Girard Machine & Tool Co., Philadelphia, Pa.

Niles-Bement-Pond Co., New York.

Watson-Stillman Co., Aldene, N.J.

**Punches, Pneumatic.**

John F. Allen Co., New York.

**Punching Machines, Horizontal.**

Bertrams, Ltd., Edinburgh, Scotland.

John Bertram & Sons Co., Dundas.

Bliss, E. W. Co., Brooklyn, N.Y.

Brown, Roggs Co., Ltd., Hamilton.

Canada.

Long & Alstatter Co., Hamilton.

Niles-Bement-Pond Co., New York.

William White & Co., Machy, Ill.

Pyrometers.

Canadian Hoskins, Limited, Walker.

ville, Ont.

Shore Instrument & Mfg. Co., New York City.

Thwing Instrument Co., Philadelphia, Pa.

Quartering Machines.

John Bertram & Sons Co., Dundas.

Niles-Bement-Pond Co., New York.

Ratchet Wrenches.

Wells Brothers Co., Greenfield, Mass.

Railing, Iron and Brass.

Canada Wire & Iron Goods Co., Hamilton.

London, Canada.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

Rail Benders.

Niles-Bement-Pond Co., New York.

Railroad Tools.

Can. Fairbanks-Morse Co., Montreal.

Niles-Bement-Pond Co., New York.

Railroad Tools, Hydraulic.

Watson-Stillman Co., Aldene, N.J.

Rapping Plates.

Stevens, F. R., Detroit, Mich.

Ratchets.

Keystone Mfg. Co., Buffalo, N.Y.

Raw Hide Pinions.

Gardner, Robt., & Son, Montreal.

Hamilton Gear & Machine Co., Toronto.

Jones & Glasco, Montreal.

Smart-Turner Machine Co., Hamilton, Ont.

**Reamers, Adjustable.**

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Wells Brothers Co., Greenfield, Mass.

Reamers, Bridge, Expanding and High Speed.

Butterfield & Co., Rock Island, Que.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

McKenna Bros. Machy. Co., Pittsburgh, Pa.

Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Whitman & Barnes Mfg. Co., St. Catharines, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Reaming Machines, Pneumatic.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago.

**Reamers, Steel Taper and Self-Feeding.**



**LUFKIN****TAPES  
AND RULES****NOTED FOR ACCURACY**

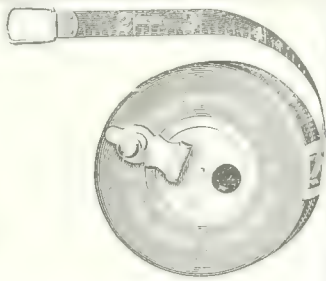
We make a complete line of  
 MACHINISTS' SCALES      MEASURING TAPES  
 FOLDING STEEL RULES      WOOD RULES  
 FOLDING BOXWOOD RULES  
 SPRING JOINT RULES



Our goods are stocked by prominent hardware and supply houses throughout the Dominion. They are fully guaranteed.

Catalogue on request.

**THE LUFKIN RULE CO. OF CANADA, LTD.**  
 WINDSOR, ONT.

**SAWS FOR SHELLS**

We have experimented on the

**SPECIAL SHELL STEEL**

and have produced a *HACK SAW BLADE* that will give unequalled service on this material in *HIGH-SPEED MACHINES*.

Possibly we could help you.

*"VICTOR BLADE—  
CANADIAN-MADE."*

**Victor Saw Works, Ltd.**  
 Hamilton, Ont.

**A Big Business**

finds it necessary to advertise. Steel Corporations, Railways, Shipping Companies, Municipalities, Provincial Governments, and in fact all concerns of magnitude.

If this is so, where the ramifications of an industry or corporation or other interests extend over a continent, across the seas and perhaps throughout the world, then there must be a basis of logic in it for those whose business is of limited dimensions.

Steady publicity is bound to make an impression—provided the means and methods employed are correct.

We have the medium and can advise you about methods—write

**CANADIAN MACHINERY**  
 143-153 University Ave. - - TORONTO

**HIGH SPEED  
HAMMERS**

For High Speed Work

**FEATURES:**

Our Bench Hammer can be adjusted high or low, and spells an other economy in space and handy utility. With it you have a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No racking too minute for use; no fitting which our machine cannot accomplish.

Send for our High Speed Hammer Book.

**THE HIGH SPEED HAMMER CO.**  
 Rochester, N.Y.

Sales Agents: The A. R. Williams Manufacturing Co. Limited, Toronto, Ontario.



**Sand Blast Systems.**

Whiting Foundry Equipment Co.,  
Harvey, Ill.

**Saw Blades.**

Diamond Saw & Stamping Works,  
Buffalo, N.Y.

**Saw Tables.**

Hub Machine Welding & Contracting  
Co., Philadelphia, Pa.

**Saw Sharpening Machines.**

Nutter & Barnes Co., Hinsdale, N.H.  
**Saw Mill Machinery.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.

Esplanade Mach. Works, Philadel-  
phia, Pa.

Gardner, Robt. & Son, Montreal.  
Curtis Pneumatic Machinery Co., St.  
Louis, Mo.

National Mach. & Sup. Co., Hamilton.  
H. W. Petrie, Toronto.

Pleissville Foundry, Pleissville, Que.  
**Saws, High-Speed, Friction.**

Esplanade Mach. Works, Philadel-  
phia, Pa.

Hunter Saw & Machine Co., Pitts-  
burgh, Pa.

Mesta Machine Co., Pittsburgh, Pa.  
Nutter & Barnes Co., Hinsdale, N.H.

**Saws, Inserted Tooth.**  
Esplanade Mach. Works, Philadel-  
phia, Pa.

Tabor Mfg. Co., Philadelphia, Pa.  
**Saws, Hack.**

Can. Fairbanks-Morse Co., Montreal.  
Diamond Saw & Stamping Works,  
Buffalo.

Ford-Smith Machine Co., Hamilton.  
Garvin Machine Co., New York.

H. W. Petrie, Toronto.  
L. S. Starrett Co., Athol, Mass.

**Saws, Circular Metal.**  
H. A. Dwyer Co., Montreal.

Esplanade Mach. Works, Philadel-  
phia, Pa.

Hub Machine Welding & Contracting  
Co., Philadelphia, Pa.

Hunter Saw & Machine Co., Pitts-  
burgh, Pa.

Tabor Mfg. Co., Philadelphia, Pa.  
**Saws, Hot and Cold.**

Hunter Saw & Machine Co., Pitts-  
burgh, Pa.

Mesta Machine Co., Pittsburgh.  
Nutter & Barnes Co., Hinsdale, N.H.

**Scleroscopes.**  
Shore Instrument & Mfg. Co., New  
York City.

**Scrap Iron.**  
L. S. Tarshis & Sons, Montreal.

**Screw Machine Products.**  
Wallace, Barnes Co., Bristol, Conn.

**Screw Machines, Hand.**  
Automatic.

Brown & Sharpe Mfg. Co., Providence,  
R.I.

Can. Fairbanks-Morse Co., Montreal.  
Garvin Machine Co., New York.

Girard Machine & Tool Co., Phila-  
delphia, Pa.

Hill, Clarke & Co., of Chicago, Chi-  
cago, Ill.

A. B. Jardine & Co., Hespeler.  
Mote & Merryweather Machy. Co.,  
Cleveland, O.

National Mach. & Sup. Co., Hamilton.  
New Britain Machine Co., New  
Britain, Conn.

H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.

Warner & Swasey Co., Cleveland, O.  
A. R. Williams Machy. Co., Toronto

Windsor Machine Co., Windsor, Vt.  
**Screw Machines, Multiple**

**Spindle.**  
New Britain Machine Co., New  
Britain, Conn.

Windsor Machine Co., Windsor, Vt.  
**Screw Plates.**

Butterfield & Co., Rock Island, Que.  
Can. Tap & Die Co., Galt, Ont.

A. B. Jardine & Co., Hespeler.  
Morse Twist Drill & Machine Co.,  
New Bedford.

Wells Brothers Co., Greenfield, Mass.  
Wiley & Russell Co., Greenfield, Mass.

**Screw Slotters.**  
Garvin Machine Co., New York.

Pratt & Whitney Co., Dundas, Ont.  
**Set Screws, Safety.**

Allen Mfg. Co., Hartford, Conn.  
**Second-Hand Machinery.**

New York Machinery Co., New York.  
Gardner, Robt. & Son, Montreal.

Can. Drawn Steel Co., Hamilton, Ont.  
Gardner, Robt. & Son, Montreal.

National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.  
Pleissville Foundry, Pleissville, Que.

The Smart-Turner Machine Co., Ham-  
ilton.

Union Drawn Steel Co., Hamilton.  
**Shanks, Straight and Taper.**

Jacobs Mfg. Co., Hartford, Conn.  
**Shapers.**

John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.

Canada Machy. Corp., Galt, Ont.  
Foss & Hill Machy. Co., Montreal.

Gardner, Robt. & Son, Montreal.  
Girard Machine & Tool Co., Phila-  
delphia, Pa.

Rendy Machine Co., Torrington, Ct.  
Hill, Clarke & Co., of Chicago, Chi-  
cago, Ill.

H. W. Petrie, Toronto.  
**Shafting.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.

**Sharpening Stones.**  
Carborundum Co., Niagara Falls, N.Y.

Norton Co., Worcester, Mass.  
**Shavings, Separators.**

Can. Buffalo Forge Co., Montreal.  
Sheldons, Ltd., Galt, Ont.

**Shearing Machines, Angle Iron,  
Bar and Gate.**

John Bertram & Sons Co., Dundas.  
Bertrams, Ltd., Edinburgh, Scotland.

Girard Machine & Tool Co., Phila-  
delphia, Pa.

A. B. Jardine & Co., Hespeler.  
Long & Alstatter, Hamilton, Ohio.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

Scott Bros., Halifax, Eng.  
Toledo Machine & Tool Co., Toledo.

Williams, White & Co., Moline, Ill.  
**Shears, Power.**

John Bertram & Sons Co., Dundas.  
Riles, E. W., Co., Brooklyn, N.Y.

Brown Boggs Co., Ltd., Hamilton.  
Canada.

Buffalo Forge Co., Buffalo, N.Y.  
Girard Machine & Tool Co., Phila-  
delphia, Pa.

Mesta Machine Co., Pittsburgh, Pa.  
National Machy. Co., Tiffin, Ohio.

National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.

Scott Bros., Halifax, Eng.  
H. W. Petrie, Toronto.

Toledo Machine & Tool Co., Toledo.  
**Shears, Lever, Hydraulic.**

Mesta Machine Co., Pittsburgh, Pa.  
Watson-Stillman Co., Aldene, N.J.

**Shears, Pneumatic.**  
John F. Allen Co., New York.

Toledo Machine & Tool Co., Toledo.  
Ohio.

**Shears, Squaring.**  
Brown, Boggs & Co., Hamilton, Can.

**Sheet Metal Working Tools.**  
Baird Machine Co., Bridgeport, Conn.

Riles, E. W., Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.

Steel Bending Brake Works, Ltd.,  
Chatham, Ont.

**Sheet Metal Stampings.**  
Duncan Electrical Co., Montreal.

**Shell Banding Machines,  
Hydraulic.**

Wm. Cramp & Sons Ship & Engine  
Bldg. Co., Philadelphia, Pa.

Can. Locomotive Co., Kingston, Ont.  
Goldie & McCulloch Co., Galt, Ont.

Ivymurder, Ltd., Montreal.  
Mote & Merryweather Machy. Co.,  
Cleveland, O.

Watson-Stillman Co., Aldene, N.J.  
West Tire Setter Co., Rochester, N.Y.

**Shell Hoisting Machinery.**  
Beath, W. D. & Son, Toronto.

**Shell Lathes.**  
Barrett Machine Tool Co., Meadville,  
Pa.

Garlock-Machinery, Toronto.  
Jenckes Machine Co., Sherbrooke, Que.

Kellogg & Co., Toronto.  
H. W. Petrie, Toronto.

**Shell Manufacturing Tools.**  
Amalgamated Machinery Corporation  
Chicago, Ill.

Frank Toomey, Inc., Philadelphia, Pa.  
Garlock-Machinery, Toronto.

New York Machinery Exchange, New  
York.

Hill, Clarke & Co. of Chicago.  
H. W. Petrie, Toronto.

**Shell Painting Machine.**  
Can. Buffalo Forge Co., Montreal.

Can. Locomotive Co., Kingston, Ont.  
**Shell Screws, Headless.**

Blake & Johnson, Waterbury, Conn.  
**Shell Riveters.**

Grant Mfg. & Machine Co., Bridge-  
port, Conn.

**Shelving, Steel Partitions.**  
Canadian Steel Products Company  
Montreal.

**Shedding.**  
Chambers, Ltd., Toronto.

**Shrapnel Shell Marker.**  
Brown Boggs Co., Hamilton, Ont.

Holden-Morgan Co., Toronto.  
Noble & Westbrook Mfg. Co., Hart-  
ford, Conn.

**Shrapnel Sand Blasts.**  
W. W. Sly Mfg. Co., Cleveland, O.

**Side Tools.**  
Armstrong Bros. Tool Co., Chicago.

**Sirens, Electric.**  
Lintz-Porter Co., Toronto.

Sheldons, Ltd., Galt, Ont.  
**Silver Solder.**

Geo. H. Lees & Co., Ltd., Hamilton,  
Ont.

**Slotters.**  
Garvin Machine Co., New York.

Niles-Bement-Pond Co., New York.  
**Smokestacks.**

MacKinnon, Holmes Co., Sherbrooke,  
Que.

Pleissville Foundry, Pleissville, Que.  
**Sockets.**

Brown & Sharpe Mfg. Co., Providence,  
R.I.

Cleveland Twist Drill Co., Cleveland.  
Keystone Mfg. Co., Buffalo, N.Y.

Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co.,  
New Bedford.

Wilt Twist Drill Co. of Canada, Ltd.,  
Walkerville, Ont.

Whitman & Barnes Mfg. Co., St.  
Catharines, Ont.

J. H. Williams Co., Brooklyn, N.Y.  
**Soldering Irons.**

Brown, Boggs & Co., Hamilton, Can.  
**Solders.**

Tallman Brass & Metal Co., Hamilton.  
**Specialties, Electric.**

Lintz-Porter Co., Toronto.  
**Special Machinery.**

Armstrong Bros., Toronto.  
W. H. Banfield & Sons, Toronto.

John Bertram & Sons Co., Dundas.  
Baird Machine Co., Bridgeport, Conn.

Bliss, E. W. Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.

Can. Fairbanks-Morse Co., Montreal.  
Canada Machy. Agency, Montreal.

Cunningham & Sons, St. Catharines,  
Ont.

Charles F. Elmes Eng. Works, Chicago  
Ford-Smith Machine Co., Hamilton.

Garrin Machine Co., New York.  
Gooley & Edlund, Inc., Courtland,  
N.Y.

Grant Mfg. & Machy. Co., Bridgeport,  
Conn.

John H. Hall & Sons, Brantford.  
Jardine, A. R. & Co., Hespeler.

National Electric Welder Co., Warren,  
Ohio.

National Forge & Tool Co., Erie, Pa.  
National Mach. & Sup. Co., Hamilton.

Pleissville Foundry, Pleissville, Que.  
Smart-Turner Machine Co., Hamilton,  
Ont.

William R. Perrin, Ltd., Toronto.  
Wm. Tod Company, Youngstown, O

**Spike Machines.**  
The Smart-Turner Machine Co., Ham-  
ilton.

**Spring Coilers.**  
Baird Machine Co., Bridgeport, Conn.

Garvin Machine Co., New York.  
**Springs, Machinery.**

Cleveland Wire Spring Co., Cleveland.  
Jac Steel, Ltd., Guelph, Ont.

Wallace, Barnes Co., Bristol, Conn.  
**Spring Machine Machinery**

(Automatic).  
Baird Machine Co., Bridgeport, Conn.

**Sprockets, Chain.**  
Morse Chain Co., Ithaca, N.Y.

Philadelphia Gear Works, Philadel-  
phia, Pa.

**Stairs, Iron.**  
Canada Wire & Iron Goods Co.,  
Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd.,  
London, Canada.

**Stamping.**  
Duncan Electrical Co., Montreal.

**Stamping Machinery.**  
Brown, Boggs & Co., Hamilton, Can.

**Stationary Ladders.**  
New Britain Machine Co., New Bri-  
tain, Conn.

**Steam Specialties.**  
General Supply Co. of Canada, Ltd.,  
Ottawa.

Sheldons, Ltd., Galt, Ont.  
**Steam Separators and Traps.**

Can. Fairbanks-Morse Co., Montreal.  
Can. Sirocco Co., Ltd., Windsor, Ont.

H. W. Petrie, Toronto.  
Sheldons, Ltd., Galt, Ont.

The Smart-Turner Machine Co., Ham-  
ilton.

**Steel Alloy.**  
Vanadium Alloys Steel Co., Pitts-  
burgh, Pa.

Vulcan Crucible Steel Co., Aliquippa  
Pa.

**Steel Chains for Pulp Mill  
and Saw Mill.**

Pleissville Foundry, Pleissville, Que.  
**Steel Barrels.**

Smart-Turner Machine Co., Hamilton  
Ont.

**Steel Bench Legs.**  
New Britain Machine Co., New Bri-  
tain, Conn.

**Steel Bending Brakes.**  
Steel Bending Brake Works, Ltd.,  
Chatham, Ont.

**Steel, Cold Rolled.**  
Can. Drawn Steel Co., Hamilton, Ont.

A. C. Leslie & Co., Ltd., Montreal.  
Union Drawn Steel Co., Hamilton  
Ont.

Wallace, Barnes Co., Bristol, Conn.  
**Steel Drums.**

Smart-Turner Machine Co., Hamilton  
Ont.

**Steel Pressure Blowers.**  
Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal

**Steel, all kinds.**

Lackawanna Steel Co., Lackawanna,  
N.Y.

**Steel, High Speed.**

Armstrong Whitworth of Canada,  
Ltd., Montreal.

Can. Fairbanks-Morse Co., Montreal.  
H. A. Drury Co., Ltd., Montreal.

Thos. Firth & Sons, Montreal.  
Hawkrige Bros. Co., Boston, Mass.

National Mach. & Sup. Co., Hamilton.  
H. W. Petrie, Toronto.

Vanadium Alloys Steel Co., Pitts-  
burgh, Pa.

Vulcan Crucible Steel Co., Aliquippa,  
Pa.

**Steel Die Engraving.**  
Noble & Westbrook Mfg. Co., Hart-  
ford, Conn.

**Steel Machinery.**  
Hawkrige Bros. Co., Boston, Mass.

**Steel Vanadium.**  
Vanadium Alloys Steel Co., Pitts-  
burgh, Pa.

Vulcan Crucible Steel Co., Aliquippa,  
Pa.

**Stock Racks for Bars, Piping,  
Etc.**

New Britain Machine Co., New Bri-  
tain, Conn.

**Stocks for Dies.**  
Wells Bros. Co., Greenfield, Mass.

**Stocks, Pipe.**  
Butterfield & Co., Rock Island, Que.

Greenfield Tap & Die Corporation,  
Greenfield, Mass.

**Stools, Steel Shop.**  
Dennis Wire & Iron Works Co., Ltd.,  
London, Canada.

**Storage Systems.**  
S. F. Bowser & Co., Fort Wayne,  
Ind.

**Stoves, Electric.**  
Lintz-Porter Co., Toronto.

**Straight Edges.**  
Steel Bending Brake Works, Ltd.,  
Chatham, Ont.

**Straitening Machinery.**  
Baird Machine Co., Bridgeport, Conn.

Bertrams, Ltd., Edinburgh, Scotland.  
National Mach. & Sup. Co., Hamilton.

**Structural Steel.**  
Hamilton Bridge Works Co., Hamil-  
ton, Ont.

Lackawanna Steel Co., Lackawanna,  
N.Y.

Owen Sound Iron Works Co., Owen  
Sound, Ont.

**Stud Driver.**  
Keystone Mfg. Co., Buffalo, N.Y.

**Switchboards and Telephones.**  
Lintz-Porter Co., Toronto.

Toronto & Hamilton Electric Co.,  
Hamilton.

**Switches, Railway.**  
National Mach. & Sup. Co., Hamilton.

**Tanks, Oil, Etc.**  
S. F. Bowser & Co., Fort Wayne, Ind.

MacKinnon, Holmes Co., Sherbrooke,  
Que.

**Tanks, Steel.**  
John Inghs Co., Toronto.

MacKinnon, Holmes Co., Sherbrooke,  
Que.

Pleissville Foundry, Pleissville, Que.  
Toronto Iron Works, Ltd., Toronto.

**Tanks, Pressure.**  
Toronto Iron Works, Ltd., Toronto.

**Tanks, Water.**  
MacKinnon, Holmes Co., Sherbrooke,  
Que.

**Tank Wagons.**  
MacKinnon, Holmes Co., Sherbrooke,  
Que.

Toronto Iron Works, Ltd., Toronto.  
**Tapes, Measuring.**

James Chesterman & Co., Ltd., Shef-  
field, Eng.

**Tapes, Friction.**  
Can. H. W. Johns-Manville Co., Ltd.,  
Toronto.

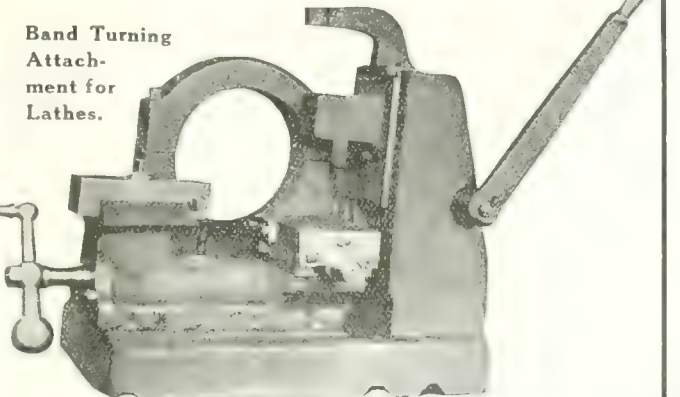
**Tapping Machines (Pneumatic).**  
Cleveland Pneumatic Tool Co. of  
Canada, Toronto.

Independent Pneumatic Tool Co.,  
Chicago, Ill.



## A Time-Saver for Turning Copper Band on Shells

Band Turning  
Attach-  
ment for  
Lathes.



This attachment will fit any engine lathe, and with its use you can turn the copper band on Shrapnel Shells down to size required and burnish them *all in one operation*.

With this device we will guarantee an output of

**. 50 Turned Copper Bands per Hour**

Used with a specially constructed steel chuck, casting of which can be finished on the lathe on which the attachment will be used.

Castings are supplied by us.

WRITE FOR PARTICULARS.

**LYMBURNER LIMITED**

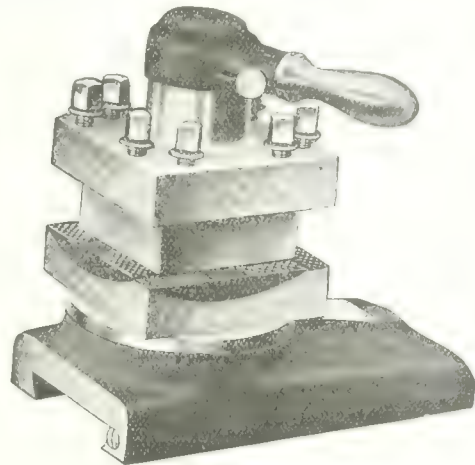
5-15 Commissioners St. Montreal, P. Que.

## Making SHRAPNEL ?

Here is Standard Equipment

The Fay & Scott turret tool post shown here is being universally adopted as standard equipment for the manufacture of shrapnel.

The square head turret, style G, is used for turning the outside of the shell. We have made these turrets for years, and can fit them to any make or size of lathe, old or new.



Style G

Catalog and full details on request

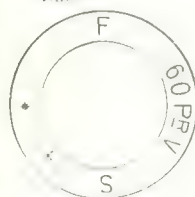
**Fay & Scott, Dexter, Me.**

## Marking High Explosive Shells

The device employed in marking the base of the shells in this machine differs materially from any other method now in use.

The blow is brought to bear on each individual letter and figure successively and with absolute uniformity.

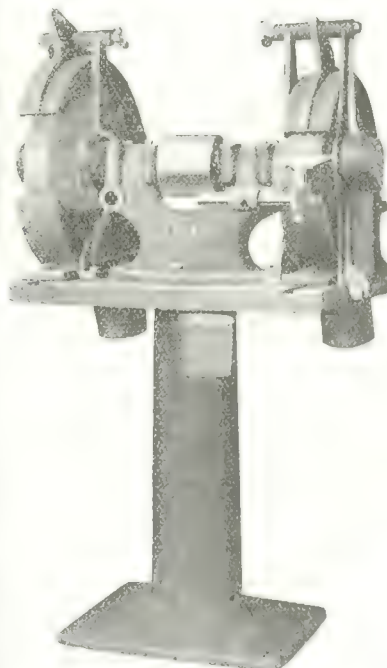
Adjustable to give shallow or deep impression  
**FIFTEEN SECONDS TIME** for marking perfectly one shell for 18-pound, 45 and 60-pound shells.



Cut Showing  
Marking on Shell

Full  
Particu-  
lars on  
Request.

**The Grant Mfg. & Machine Company**  
Bridgeport, Conn.



**Partridge  
Grinders  
ARE  
GOOD  
GRINDERS  
With  
The  
Price  
Ground  
Down.**

If you don't write for full particulars, you will miss something good.

MANUFACTURED BY

**E. O. PARTRIDGE**

2039 Lake Street West CHICAGO

Good Canadian Agents Wanted—WRITE NOW.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

**Tap Chucks.**  
Wells Bros., Greenfield, Mass.

**Taps, Adjustable.**  
Geometric Tool Co., New Haven, Conn.  
Manufacturers Equipment Co., Chicago, Ill.  
Morse Machine & Tool Co., Detroit.

**Taps, Dies and Wrenches.**  
Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Chapman & Die Co., Galt, Ont.  
Cleveland Twist Drill Co., Cleveland.  
Geometric Tool Co., New Haven, Conn.  
A. B. Jarline & Co., Hespeler, Ont.  
Morse Twist Drill & Machine Co., New Bedford.  
Morse Machine & Tool Co., Detroit.  
H. W. Patton, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
L. S. Starrett Co., Athol, Mass.  
Wells Brothers Co., Greenfield, Mass.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Technical Books.**  
The MacLean Publishing Co., Ltd., Toronto.

**Telephone Systems.**  
Lantz-Porter Co., Toronto.

**Testing Instruments, Metallurgical.**  
Shore Instrument & Mfg. Co., New York City.

**Testing Laboratories.**  
Can. Inspection & Testing Laboratories, Ltd., Montreal.  
Toronto Testing Laboratory, Toronto.

**Thread Cutting Machines.**  
Can. Fairbanks-Morse Co., Montreal.  
Garvin Machine Co., New York.  
Geometric Tool Co., New Haven, Conn.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Landis Machine Co., Waynesboro, Pa.  
H. W. Patton, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
National Machy. Co., Tiffin, Ohio.

**Time Clocks.**  
International Time Recording Co., Toronto.  
Lantz-Porter Co., Toronto.

**Tinsmiths' Tools.**  
Brown, Boggs & Co., Hamilton, Can.  
Steel Bending Brake Works, Ltd., Chatham, Ont.

**Tire Setting Machines, Hydraulic.**  
William R. Perrin, Ltd., Toronto.  
West Tire Setter Co., Rochester, N.Y.

**Tire, Wheels.**  
Wells Bros. Co., Greenfield, Mass.  
**Toolmakers' Files.**  
American Swiss File & Tool Co., New York.

**Tool Boxes, Steel.**  
Can. Steel Products Co., Montreal.

**Tool Holders.**  
Armstrong Bros. Tool Co., Chicago.  
Cleveland Twist Drill Co., Cleveland.  
Modern Tool Co., Erie, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
J. H. Williams Co., Brooklyn, N.Y.

**Tool Room Partitions.**  
Can. Wire & Iron Goods Co., Hamilton.

**Tool Posts, Lathe.**  
Armstrong Bros. Tool Co., Chicago.

**Tool Steel.**  
Armstrong, Whitworth, Ltd., of Canada, Montreal.  
Can. Fairbanks-Morse Co., Montreal.

**Tools.**  
Thos. Firth & Sons, Montreal.  
Hawbridge Bros. Co., Boston, Mass.  
A. C. Jaske & Co., Ltd., Montreal.  
National Mach. & Sup. Co., Hamilton.  
H. W. Patton, Toronto.  
Vulcan Crucible Steel Co., Aliquippa, Pa.

**Tools, Blacksmiths', Etc.**  
A. R. Williams Machy. Co., Toronto.

**Tools, Electrical.**  
A. R. Williams Machy. Co., Toronto.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.  
United States Elec. Tool Co., Cincinnati, O.

**Tools, Lathe, Planer and Slatier.**  
Armstrong Bros. Tool Co., Chicago.

**Torches, Steel.**  
Stevens, F. B. Detroit, Mich.  
Armstrong, Whitworth of Canada, Ltd., Montreal.

**Track Bits.**  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Track Systems.**  
L. C. W. D. & Son, Toronto.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Track Tools.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
**Transformers and Converters.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
H. W. Patton, Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.

**Transmission Machinery.**  
American Pulley Co., Philadelphia, Pa.  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Can. Drawn Steel Co., Hamilton, Ont.  
Hamilton Gear & Mach. Co., Toronto.  
Jones & Glasco, Montreal.  
Main Belting Co., Montreal.  
Morse Chain Co., Ithaca, N.Y.  
H. W. Patton, Toronto.  
Plessisville Foundry, Plessisville, Que.  
F. Reddaway & Co., Montreal.  
The Smart-Turner Machine Co., Hamilton.

**Transmission Towers.**  
Can. Bridge Co., Walkerville, Ont.  
Canadian Ingersoll-Rand Co., Ltd., Montreal.  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
Northern Crane Works, Walkerville.  
Tallman Brass & Metal Co., Hamilton.

**Traveling Cranes.**  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Trolley Hoists, Electric.**  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Trucks, Lumber and Kila.**  
Sheldons, Ltd., Galt, Ont.  
Northern Crane Works, Walkerville.

**Trucks, Factory, Freight, Etc.**  
Chambers, Ltd., Toronto.  
Chapman Double Ball Bearing Co., Toronto.  
General Supply Co. of Canada, Ltd., Ottawa.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Tube Expanders (Rollers).**  
A. B. Jarline & Co., Hespeler.  
Watson-Stillman Co., Aldene, N.J.

**Tumbling Barrels.**  
Baird Machine Co., Bridgeport, Conn.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Turbines, Steam.**  
Southwark Foundry & Machine Co., Philadelphia, Pa.

**Turnbuckles.**  
Canadian Billings & Spencer, Ltd., Welland.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.

**Turret Machines.**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Pay & Scott, Dexter, Me.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hill, Clarke & Co. of Chicago, Chicago, Ill.  
Match & Merryweather Machy. Co., Cleveland, O.  
New Britain Machine Co., New Britain, Conn.  
H. W. Patton, Toronto.  
Pratt & Whitney, Hartford, Conn.  
Turner Machine Co., Ltd., Danbury, Conn.  
Warner & Swasey, Cleveland, O.

**Turbines, Steam, Water.**  
Plessisville Foundry, Plessisville, Que.

**Upsetting and Bending Machinery.**  
A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas.  
Brown, Boggs Co., Ltd., Hamilton.

**Vacuum Pumps.**  
A. B. Jarline & Co., Hespeler.  
National Machy. Co., Tiffin, O.  
Niles-Rement-Pond Co., New York.  
H. W. Patton, Toronto.  
Watson-Stillman Co., Aldene, N.J.

**Valves, Foot.**  
Smart-Turner Mach. Co., Hamilton.

**Valve Grinders (Pneumatic).**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Valves, Hydraulic.**  
Can. Hooper & Boschert Press Co., Montreal.  
Charles E. Elmer Eng. Works, Chicago, Ill.  
Mesta Machine Co., Pittsburg, Pa.  
Southwark Foundry & Machine Co., Philadelphia.  
Watson-Stillman Co., Aldene, N.J.  
R. D. Wood & Co., Philadelphia, Pa.

**Valve Leathers.**  
Graton & Knight Mfg. Co., Montreal.

**Valves, Back Pressure, Steam.**  
Mesta Machine Co., Pittsburg, Pa.  
Sheldons, Limited, Galt.

**Vanadium Steel.**  
H. A. Drury Co., Ltd., Montreal.  
Hawkrige Bros. Co., Boston, Mass.

**Ventilating Apparatus.**  
Can. Sirocco Co., Ltd., Windsor, Ont.  
Sheldons, Limited, Galt.  
H. W. Patton, Toronto.  
A. R. Williams Machy. Co., Toronto.

**Vises, Bench.**  
Emmert Mfg. Co., Waynesboro, Pa.  
Hollands Mfg. Co., Erie, Pa.  
National Mach. & Sup. Co., Hamilton.  
New Britain Machine Co., New Britain, Conn.  
H. W. Patton, Toronto.

**Vises, Pipe.**  
Armstrong Mfg. Company, Bridgeport, Conn.  
Bignall & Keeler Mach. Works, Edwardsville, Ill.  
Butterfield & Co., Rock Island, Que.  
Emmert Mfg. Co., Waynesboro, Pa.  
National Mach. & Sup. Co., Hamilton.  
J. H. Williams Co., Brooklyn, N.Y.

**Vises, Planer and Shaper.**  
Girard Machine & Tool Co., Philadelphia, Pa.  
National Mach. & Sup. Co., Hamilton.  
Skinner Chuck Co., New Britain, C.

**Vises, Milling Machine.**  
National Mach. & Sup. Co., Hamilton.

**Vises, Woodworking.**  
Emmert Mfg. Co., Waynesboro, Pa.

**Washers.**  
Graton & Knight Mfg. Co., Worcester, Mass.

**Washer Machines.**  
National Machy. Co., Tiffin, Ohio.

**Waterproof Coating, Cement, Fabric.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.

**Watchman's Clocks.**  
Lantz-Porter Co., Toronto.  
A. R. Williams Machy. Co., Toronto.

**Water Cinder Mills.**  
Whiting Foundry Equipment Co., Harvey, Ill.

**Water Towers.**  
Toronto Iron Works, Ltd., Toronto.

**Welding and Cutting Clamps.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding, Autogenous.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding, Acetylene and Oxygen.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding Machines, Electric, etc.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding, Autogenous.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding, Acetylene and Oxygen.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding Machines, Electric, etc.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding, Autogenous.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding Machines, Electric, etc.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**L'Air Liquide Society, Toronto.**  
Lever Bros., Toronto.  
National Electric Welder Co., Cincinnati, O.

**Welding, Acetylene and Oxygen.**  
Can. Blaugas Co., Ltd., Montreal.  
Detroit Electric Welder Co., Detroit, Mich.

**Wheels, Emery, Carborundum.**  
Can. Hart Wheels, Ltd., Hamilton, Ont.  
H. W. Patton, Toronto.

**Wheels, Belt, Fly, Gear and Rope.**  
Mesta Machine Co., Pittsburg, Pa.

**Winches.**  
John H. Hall & Sons, Brantford.  
Northern Crane Works, Walkerville.

**Window Wire Guards.**  
Canada Wire & Iron Goods Co., Hamilton.

**Wire Cloth and Perforated Metals.**  
Canada Wire & Iron Goods Co., Hamilton.

**Wire Forms.**  
Wallace, Barnes Co., Bristol, Conn.

**Wire Forming and Stamping Machinery.**  
Brown, Boggs Co., Ltd., Hamilton, Canada.

**Wire Guards and Railings.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.

**Wire Nails.**  
Parmenter & Bulloch Co., Gananoque.

**Wire Nail Machinery.**  
National Machy. Co., Tiffin, Ohio.  
A. R. Williams Machy. Co., Toronto.

**Wire, Spring.**  
Wallace, Barnes Co., Bristol, Conn.

**Wire Straighteners and Cutters.**  
Baird Machine Co., Bridgeport, Conn.  
Brown, Boggs Co., Ltd., Hamilton, Canada.

**Wire Colling and Pointing Machines.**  
Baird Machine Co., Bridgeport, Conn.  
F. B. Shuster Co., New Haven, Conn.

**Wood Boring Machines.**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Woodworking Machinery.**  
Buffalo Forge Co., Buffalo, N.Y.  
Can. Fairbanks-Morse Co., Montreal.  
Garlock-Machinery, Toronto.  
Girard Machine & Tool Co., Philadelphia, Pa.  
H. W. Patton, Toronto.

**Wrenches, Compression.**  
Lutz-Webster Engineering Co., Inc., Philadelphia, Pa.

**Wrenches.**  
Armstrong Bros. Tool Co., Chicago, Ill.

**Wrenches, Automobile Narrow Jaw and Monkey.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Pipe, Monkey.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.

**Wrenches, Ratchet and Basin.**  
Remis & Call Hardware & Tool Co., Springfield, Mass.



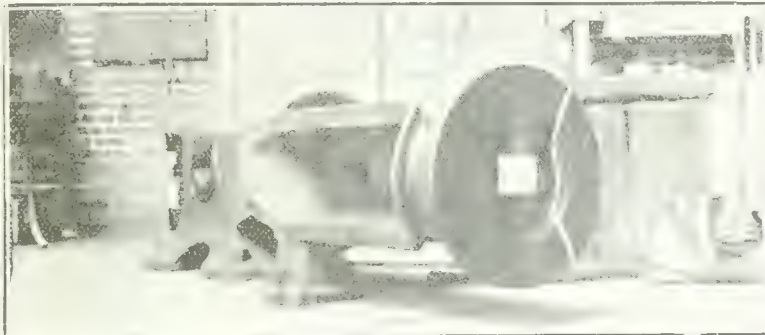
# WHY NOT APPLY the OXY-ACETYLENE WELDING and CUTTING PROCESS

for your REPAIRS and in your MANUFACTURE ?  
It SAVES you MONEY. ————— It BRINGS you MONEY.

## —OXYGEN—

—PURE, EFFICIENT, SAFE, LOW-PRICED—

**WELDING and CUTTING PLANTS** as well as **Pure DISSOLVED ACETYLENE**  
Portable and Stationary—Made in Canada



Broken Engine Cylinder—PERFECTLY RECLAIMED by WELDING  
in short time and at low cost. (See white line.)

Ask for more information—DO IT NOW—  
Use THIS COUPON, please. →

supplied by

### L'AIR LIQUIDE SOCIETY

—Factories the World over—

26 Boler St.      Maisonneuve      325 William Ave.  
WEST-TORONTO      MONTREAL      WINNIPEG

—The OXY-ACETYLENE PEOPLE—

L'Air Liquide Society, Maisonneuve,  
MONTREAL, P.Q.

Get it? Will you please send, without  
obligation to me, postpaid, your New Booklet?

Name \_\_\_\_\_

Address \_\_\_\_\_

Profession \_\_\_\_\_

Business \_\_\_\_\_

Date \_\_\_\_\_

## Who Wants Your Order?

¶ The firms that are most likely to appreciate your order are the ones that are keenest to get it.

¶ The firms that advertise are bidding for your business in a broad, yet personal way,—the modern way. They are proud of their goods and are not ashamed to show them in public to the most critical.

¶ Patronize the firms that advertise. Consult this directory of Machinery Manufacturers and you will connect with good concerns.

¶ A firm that appreciates your order will serve you well.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

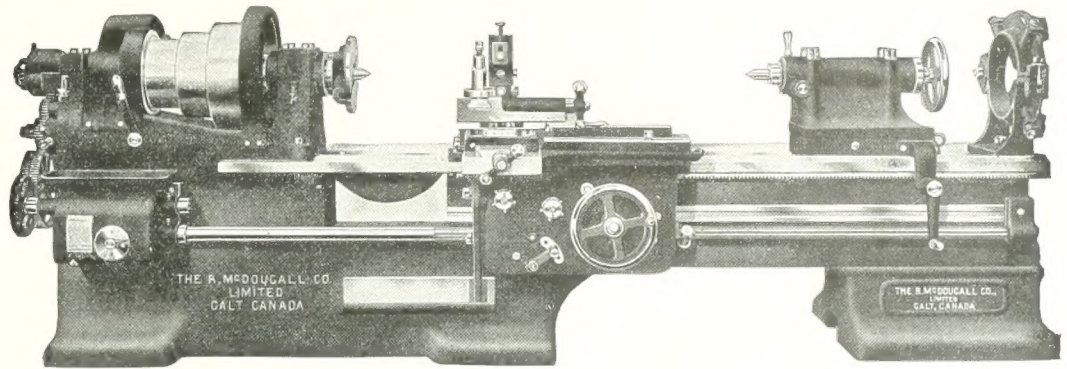






# McDougall Gap Lathes

—  
Strength  
Accuracy  
Quality



Take a look at the next money you intend to invest in a Lathe. Then, take a look at the money's worth we offer you in our machine. Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too. We invite the closest inspection.

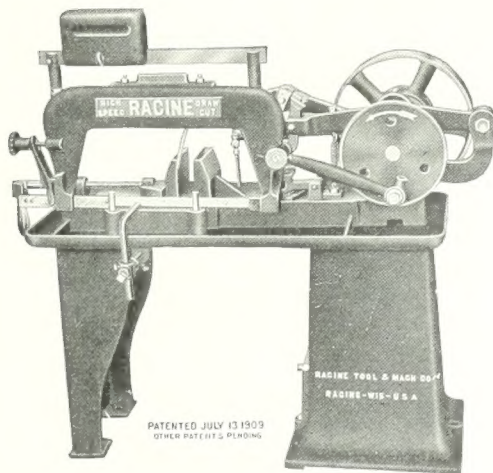
Particulars on request.

## The R. McDougall Company Limited

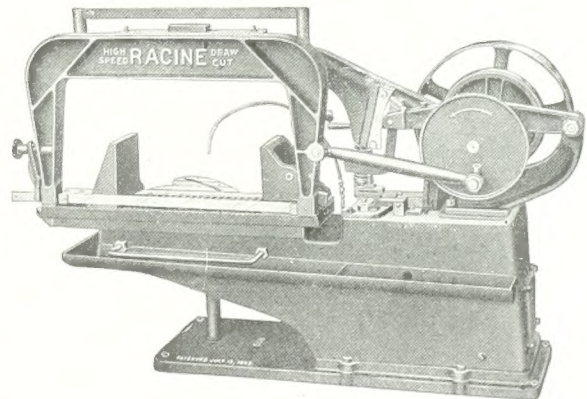
Manufacturers

GALT, Ont., Canada

The Canadian Fairbanks-Morse Co., Limited, Sales Agents.



6 in. MACHINE



12 in. MACHINE

The RACINE HIGH-SPEED METAL CUTTING MACHINE used in BATTERIES is the most Economical machine for cutting off steel billets for the manufacture of shells.

Estimated cost of cutting 500,000 3½" blanks, 50 per cent. carbon, using 30 No. 1 Racine Hack Saw Machines and Tungsten Hack Saw blades in 4½ months, including price of machines, saws, power, and labor, is 2½¢ per cut.

A greater capacity at lower cost of installation and up-keep, with a saving of over \$11,000.00 in material on the above quantity.

For further particulars apply to

Canadian Agents

## THE FOSS & HILL MACHINERY COMPANY

305 St. James Street, MONTREAL

*The advertiser would like to know where you saw his advertisement—tell him.*



CANADIAN MACHINERY



TRADE COMMISSIONER SERVICE

MELBOURNE, October 20th,  
AUSTRALIA. 1915.

To The Editor,  
CANADIAN MACHINERY,  
Toronto, CANADA.

Dear Sir,

Through your consideration in forwarding your valued journal, gratuitously, to this office - in the interests of your advertisers and for my personal information to keep me posted in the manufacturing progress in Canada - I was able to place your issue of July 1st last at the disposal of the Commonwealth Munitions Committee, Melbourne, with the result that your special article on "High Explosive Shell Manufacture" in Canada was re-printed with all illustrations in booklet form (giving "Canadian Machinery" due credit) for the information of Australian manufacturers of munitions of war.

I am sending, herewith, a copy of the booklet as evidence of the value placed in Australia upon the articles appearing in your journal.

Indeed, all the munitions numbers of your journal have been carefully gone into by the Federal Committee, from whose personnel a sub-committee has been appointed to proceed to India, on behalf of the Commonwealth Government, to report upon the Arsenals in that country.

It is only fair to state that the first reliable articles upon the manufacture of high explosives made available in Australia were those which appeared in your invaluable journal.

Please accept my sincere appreciation and thanks for your continued consideration in forwarding CANADIAN MACHINERY to me,

Herewith (reprint)  
Booklet on High  
Explosive Shell  
Manufacture.

I am, dear Sir,  
Yours faithfully,

*H. H. Ross.*

Canadian Trade Commissioner  
for Australia.



